Measurement of Maximum Permissible Exposure

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber.* The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna,* we can find the distance right away from the product, where the limit of the MPE is.

2. Description of EUT

FCC ID	:	VUIUPWL6024
Product Name	:	WIFI module
Model Name	:	UPWL6024
Frequency Range	**:**	IEEE 802.11b/g/n Draft 1.0 20M: 2.412GHz ~ 2.462GHz
		IEEE 802.11n Draft 1.0 40M: 2.422GHz ~ 2.452GHz
Channel Spacing	**:**	5MHz
Support Channel	**:**	IEEE 802.11b/g/n Draft 1.0 20M: 11 Channels
		IEEE 802.11n Draft 1.0 40M: 7 Channels
Modulation Skill	**:**	DBPSK, DQPSK, CCK, OFDM
Power Type	**:**	Powered by PCI Express interface of client's device

3. Limits for *Maximum Permissible Exposure (MPE)*

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Filed Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	$900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	$180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately. The following shows only our observation have the greatest emissions.]

According to **OET BULLETIN 56 Fourth Edition/August 1999**, **Equation for Predicting RF Fields:**

Friis Transmission Formula: $S = \frac{PG}{4\pi R^2} = \frac{431.49 \times 3.42}{4\pi (20)^2} = 0.294 mW/cm^2$

Estimated safe separation: $R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{431.49 \times 3.42}{4\pi}} = 10.837 cm$

Note: "The safe estimated separation that the user must maintain from the antenna is at least 6.5cm"

Where: S = *power density* (in appropriate units, e.g. mW/cm2)

P = *power input* to the antenna (in appropriate units, e.g., mW)

G = *power gain* of the antenna in the direction of interest relative to an isotropic radiator

R = *distance* to the center of radiation of the antenna (appropriate units, e.g., cm)

The *Numeric gain G* of antenna with a gain specified in dB is determined by:

G = Log $^{-1}$ (***dB*** antenna gain / 10)

G = Log $^{-1}$ (5.34 / 10) = 3.42

Appendix

Antenna Specification
(Antenna#1 UCW2583)

納入仕様書

《新規 . 變更》

客戶 PEGATRONCORP

制　　定	2009 年 09 月 16 日
部品番號	1415-00XR000
品　　名	WPB107 Mini1.13(Black) Antenna with MHF L74mm
公司番號	UCW2583

〔驗收印欄〕

蘇州萬旭電子元件有限公司
江蘇省蘇州市相城區望亭鎮問渡路168號
PC:215155
TEL:86-512-65381105
FAX:86-512-65381104

作　成	檢　圖	確　認	核　準
曹 吉	張永明	谭秋菊	陆晓东

SPECIFICATION

Description……..: WPB107 Mini1.13(Black) Antenna with MHF L74mm

2.Customer……..: PEGATRONCORP
3.Part No…….: 1415-00XR000
4.Coaxial Lenght…….:74mm(see Drawing)
5.Electrical Characteristics
Operating Frequency……..…….: 2~6GHz
Impedance……..…….: 50 Ohm nominal

2.4 Operating Temp,Ex…….…..…:-20℃ ~ +65℃

2.5 Storage Temp,Ex……:-30℃ ~ +75℃

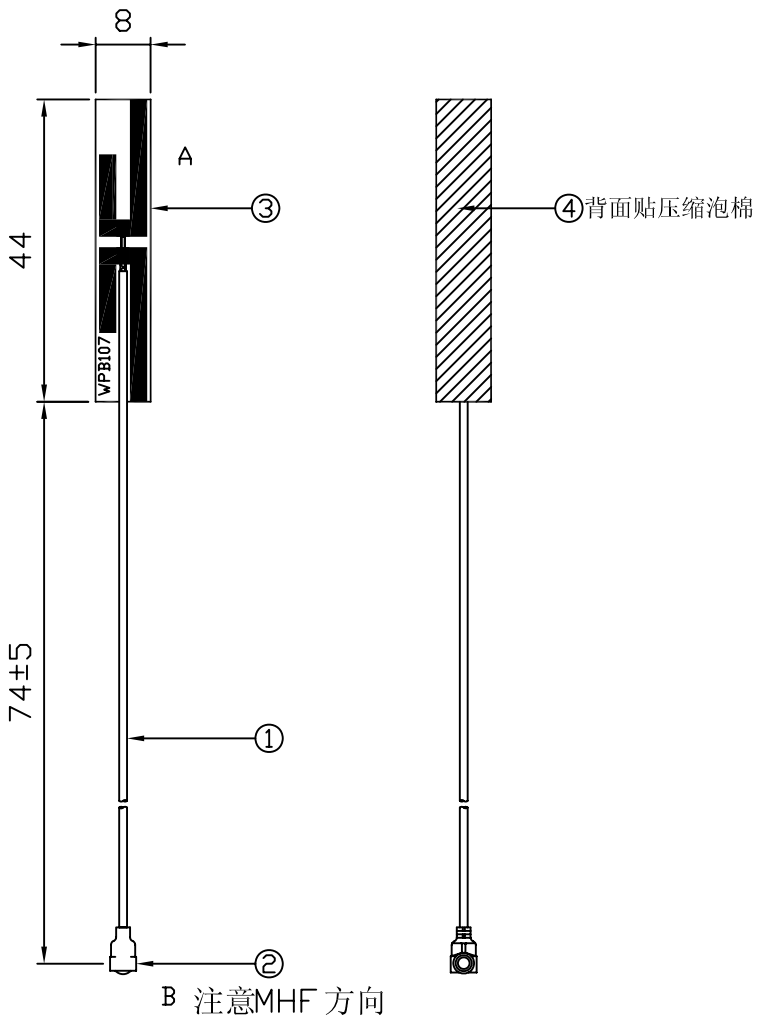
6.Mechanical Chararteristics
Connector……...:MHF

7.Raw Material
Coaxial Cable…….: Mini 1.13
Core…….: ND

變更記錄 1.
2.
3.
4.

TOLERANCES:
X ±1.0
X.X ±0.6
X.XX ±0.2
ANGULAR ±5.0°

生产厂：2F



作業說明：
1. 天線組立依據天線組立作業標準指導書規定製作。
依據QC管理工程圖，執行品質管制。

NO	部品名	環材	部番	顏色	切斷尺寸	用量
4	压缩泡棉	V	EVA压缩泡棉 7mm*43mm*3.6T 黑 HF	黑		1
3	PCB	V	WPB107 HF			1
2	MHF Connector	V	20278-111R-13	金		1
1	MINI 1.13 Coaxial Cable	V	MINI RG OD:1.13 黑色 LF-Sn LF HF	黑		1

第3角法	圖面不用實測			部品番號	1415-00XR000
比例 FREE	作成	檢圖	確認	核准	
單位: mm	曹吉	张永明	谭秋菊	陆晓东	品名 WPB107 Mini1.13(Black) Antenna with MHF L74mm
09 年 09 月 16 日					公司番號 UCW2583

成品電腦編號: HY1A17051A

蘇州萬旭電子元件有限公司

Wanshih Electronic Co., LTD

Research & Development Department

Antenna Measurement

CUSTOMER:UNIHAN

ANT BANDWIDTH :2.4-2.5,5.15-5.35,5.725-5.875GHz

TEST INSTRUMENT：1. AGILENT E5071B NETWORK ANALYZER

2.Sporton ETS OTA Chamber

ENGINEER：Puma Lu

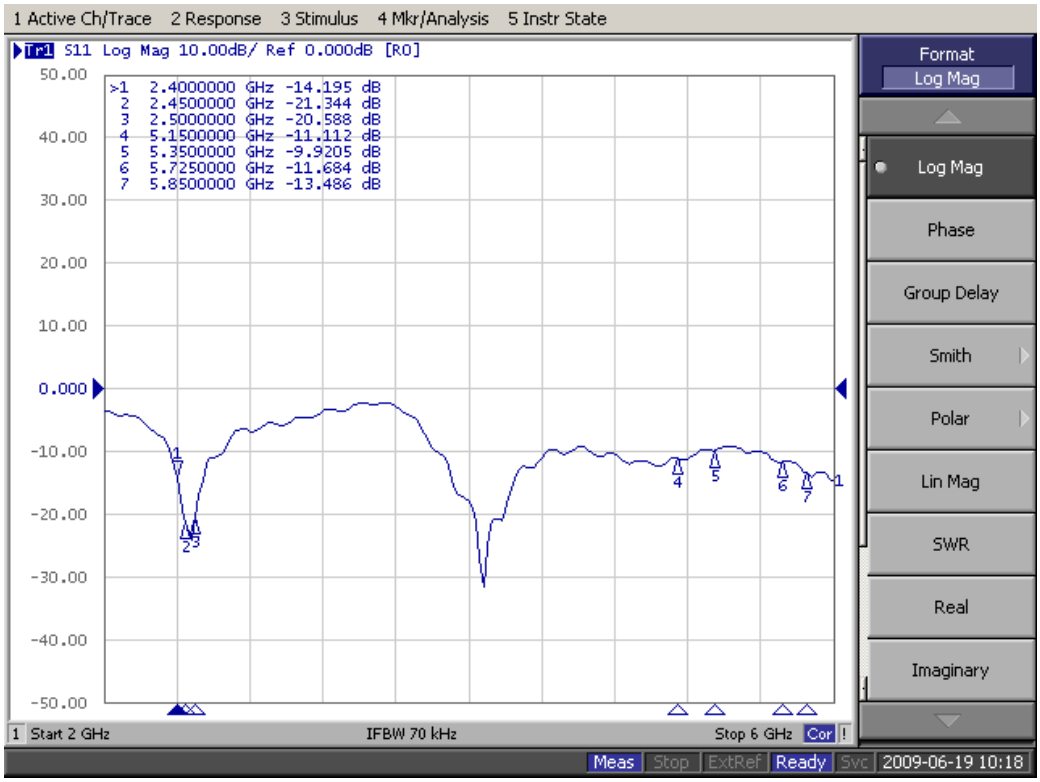
DATE：2009/06/19

HOUSING

LOCATION OF ANTS

ANT 1

RETURN LOSS:



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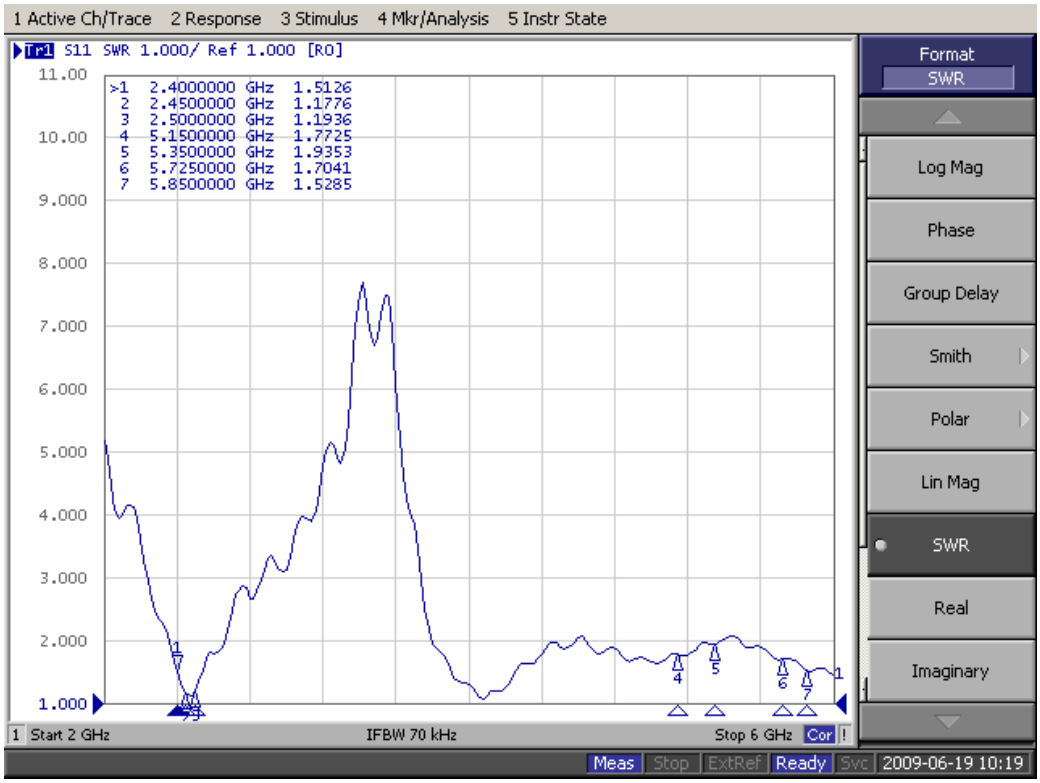
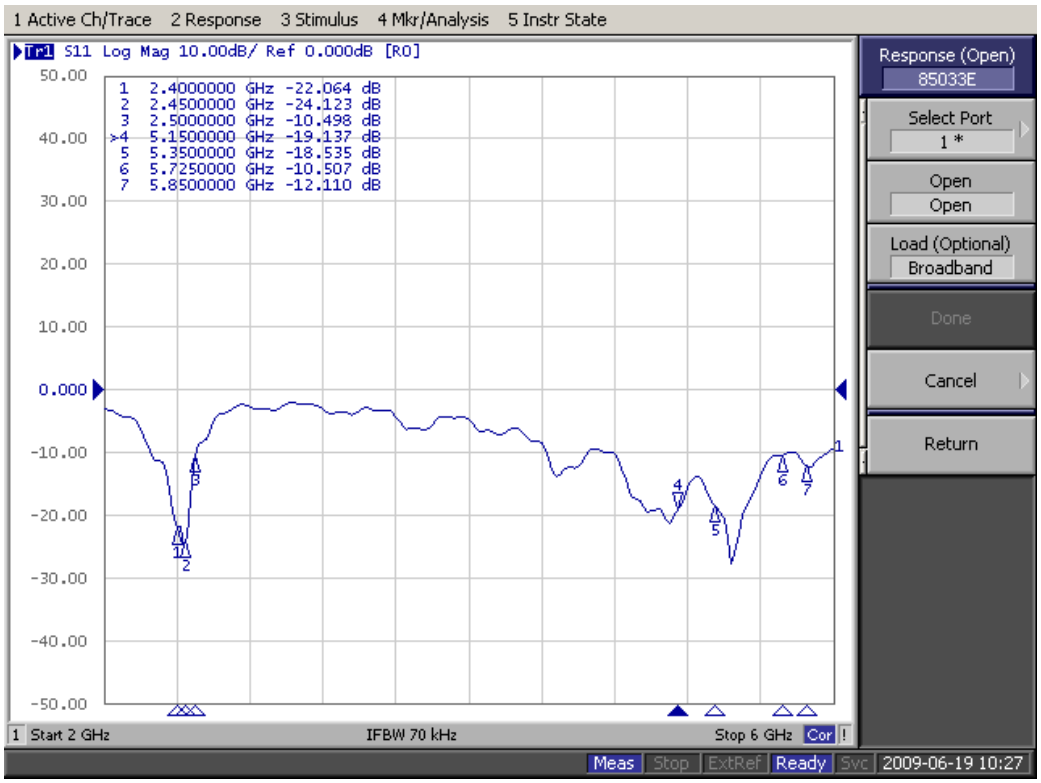


ANT 2

RETURN LOSS:



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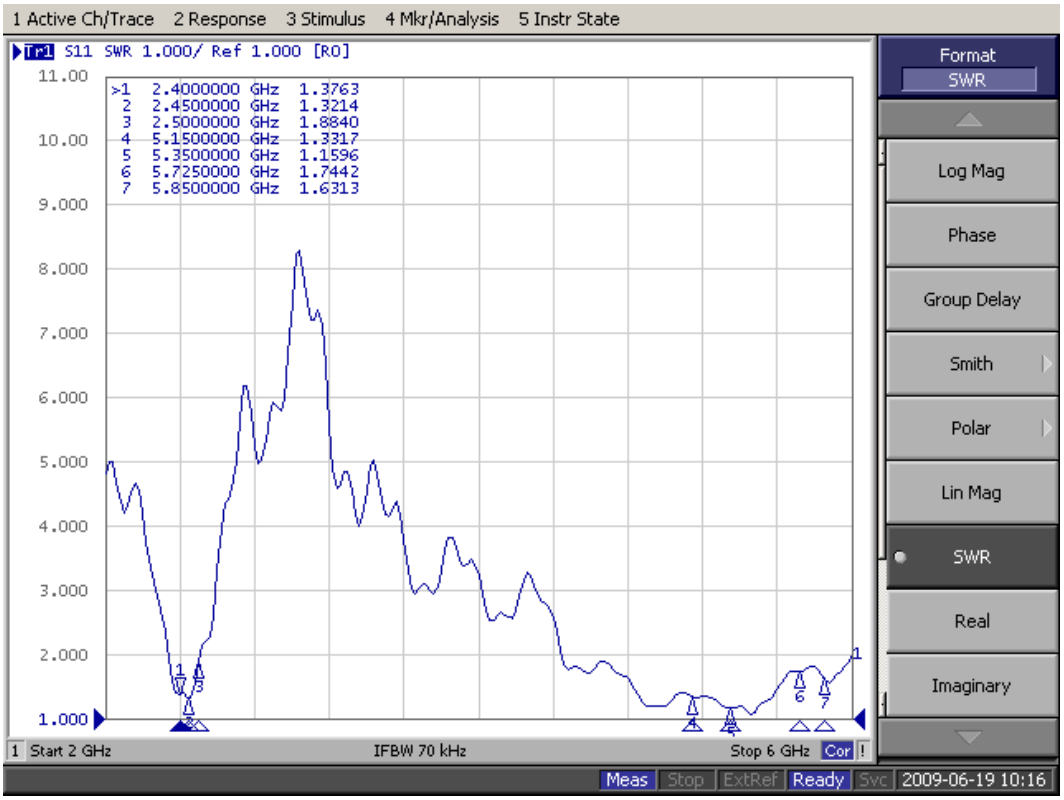
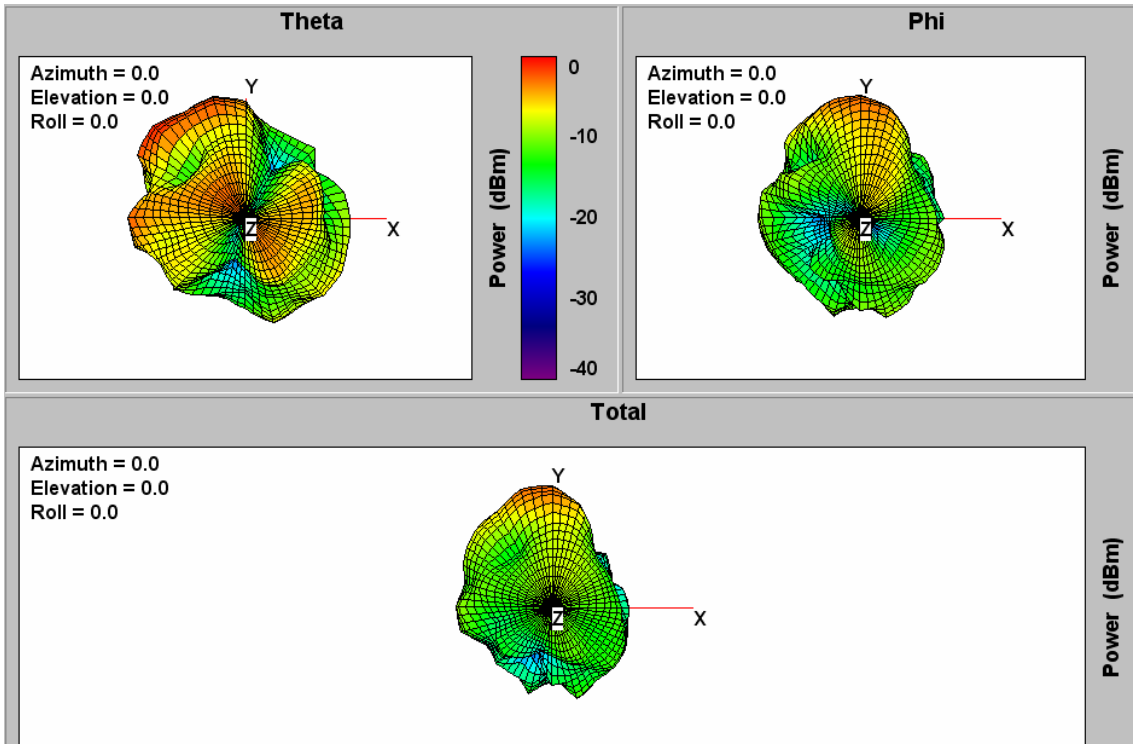
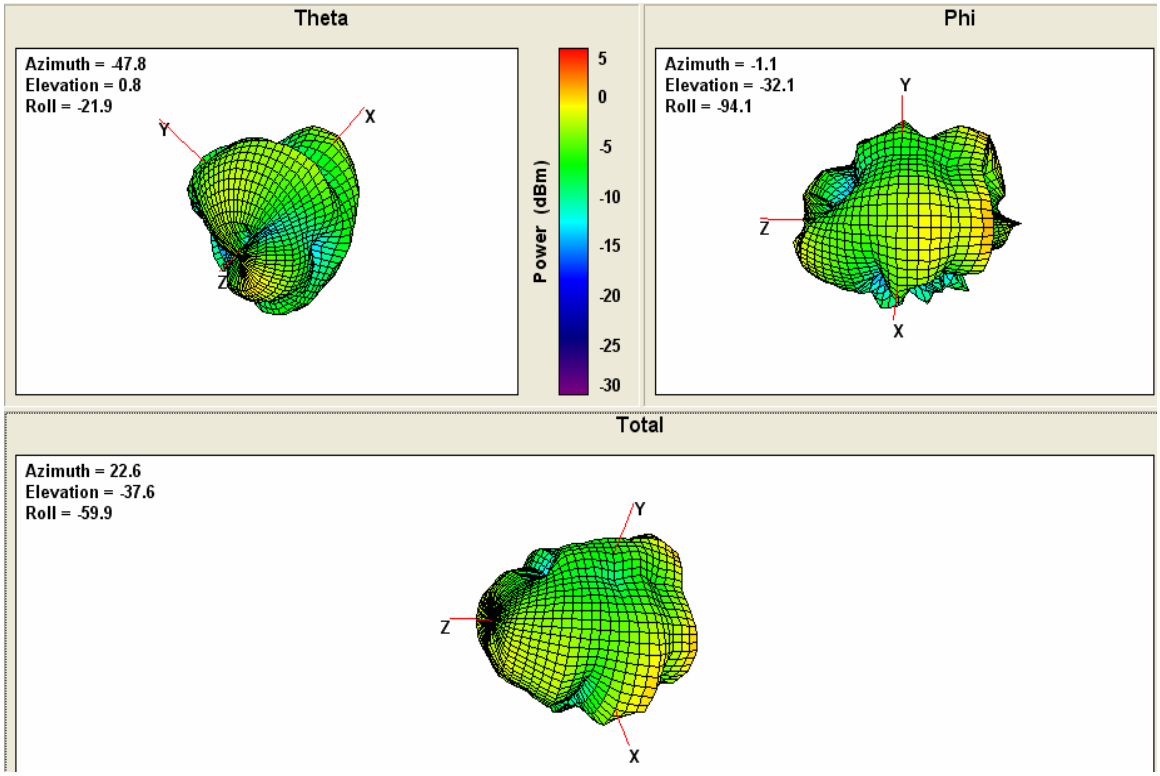


Antenna 1 Pattern



Antenna 2 Pattern



Test Summary

Antenna 1

Model	WANSHIN_DIPOLE_ANT_3D_FS_2400-5850 MHz								
Test / Position	Gain / Free Space								
Frequency	2400	2450	2500	4950	5150	5250	5350	5725	5850
Ant. Port Input Pwr. (dBm)	0	0	0	0	0	0	0	0	0
Tot. Rad. Pwr. (dBm)	0	0	0	0	0	0	0	0	0
Peak EIRP (dBm)	3.1632	4.36112	5.34066	4.4651	5.24286	5.31324	4.9749	3.92627	4.06678
Directivity (dBi)	7.14573	7.09798	7.03793	6.35548	7.05054	6.94101	6.55653	5.66147	5.92974
Efficiency (dB)	-3.98254	-2.73686	-1.69727	-1.89038	-1.80768	-1.62778	-1.58163	-1.7352	-1.86296
Efficiency (%)	39.9711	53.2493	67.6509	64.7085	65.9527	68.742	69.4764	67.0625	65.1184
Gain (dBi)	3.1632	4.36112	5.34066	4.4651	5.24286	5.31324	4.9749	3.92627	4.06678
NHPRP ±Pi/4 (dBm)	-5.55515	-4.32298	-3.38968	-4.40643	-4.29672	-4.1251	-4.04478	-4.13462	-4.19475
LHPRP / TRP Ratio (dB)	-3.5328	-3.80454	-4.01577	-4.69195	-4.83218	-4.83934	-4.80762	-4.87711	-4.72813
LHPRP / TRP Ratio (%)	44.3323	41.6434	39.6664	33.9472	32.8687	32.8145	33.0551	32.5304	33.6657
Front/Back Ratio (dB)	11.683	10.4828	13.859	2.96604	3.30389	2.83184	1.93979	3.18947	8.71662
Phi BW (°)	51	52	54	18	17	18	22	65	89
#NAME?	24	21	35	9	9	10	11	44	57
#NAME?	27	31	19	9	8	8	11	21	32
Theta BW (°)	52	61	57	54	40	37	38	101	64
#NAME?	29	37	27	16	15	15	17	52	36
#NAME?	23	24	30	38	25	22	21	49	28
Boresight Phi (°)	105	105	90	90	90	90	90	285	315
Boresight Th. (°)	75	75	75	150	150	150	150	15	15
Maximum Power (dBm)	3.1632	4.36112	5.34066	4.4651	5.24286	5.31324	4.9749	3.92627	4.06678
Minimum Power (dBm)	-21.1277	-16.1791	-21.1285	-17.9613	-18.2173	-20.8425	-21.4879	-26.0244	-19.417
Average Power (dBm)	-4.00758	-2.85354	-1.74072	-1.07929	-1.08213	-0.799589	-0.741692	-0.837944	-1.02597
Max/Min Ratio (dB)	24.2909	20.5402	26.4691	22.4264	23.4602	26.1558	26.4628	29.9507	23.4838
Max/Avg Ratio (dB)	7.17078	7.21466	7.08139	5.54438	6.32499	6.11283	5.71659	4.76421	5.09275
Min/Avg Ratio (dB)	-17.1202	-13.3255	-19.3878	-16.882	-17.1352	-20.0429	-20.7462	-25.1865	-18.391
Average Gain (dB)	-3.98254	-2.73686	-1.69727	-1.89038	-1.80768	-1.62778	-1.58163	-1.7352	-1.86296
Note									

Antenna 2

Model	WANSHIN_TEST_3D-1_FS_2400-5825 MHz							
Test / Position	Gain / Free Space							
Frequency	2400	2450	2500	4900	5150	5250	5750	5825
Ant. Port Input Pwr. (dBm)	0	0	0	0	0	0	0	0
Tot. Rad. Pwr. (dBm)	**-2.5362**	**-3.4669**	**-4.3993**	**-2.1682**	**-1.8984**	**-1.8421**	**-2.4334**	**-2.7068**
Peak EIRP (dBm)	**2.54811**	**0.95768**	**-0.0502**	**7.19245**	**7.74273**	**7.88411**	**6.2912**	**5.3316**
Directivity (dBi)	5.08429	4.4246	4.34907	9.36065	9.64115	9.72623	8.72462	8.03842
Efficiency (dB)	-2.53618	-3.46692	-4.3993	-2.1682	-1.89842	-1.84211	-2.43342	-2.70682
Efficiency (%)	55.7676	45.0099	36.3136	60.6988	64.5889	65.4318	57.1029	53.6189
Gain (dBi)	2.54811	0.957681	-0.050235	7.19245	7.74273	7.88411	6.2912	5.3316
NHPRP ±Pi/4 (dBm)	-4.48363	-5.38277	-6.15315	-4.15072	-3.93331	-3.852	-4.55516	-4.67412
LHPRP / TRP Ratio (dB)	-2.56314	-2.6033	-2.79237	-1.66116	-1.66873	-1.72815	-2.34673	-2.49538
LHPRP / TRP Ratio (%)	55.4225	54.9123	52.573	68.2157	68.0968	67.1714	58.2542	56.294
Front/Back Ratio (dB)	5.14592	5.03607	3.01379	17.221	11.6439	14.1259	8.28327	10.2933
Phi BW (°)	76	61	97	25	24	22	19	19
#NAME?	30	37	24	14	15	15	6	7
#NAME?	46	24	73	11	9	7	13	12
Theta BW (°)	75	54	49	30	27	27	29	33
#NAME?	63	40	28	11	13	13	17	18
#NAME?	12	14	21	19	14	14	12	15
Boresight Phi (°)	150	15	165	135	135	135	150	150
Boresight Th. (°)	135	105	150	150	150	150	150	150
Maximum Power (dBm)	2.54811	0.957681	-0.050235	7.19245	7.74273	7.88411	6.2912	5.3316
Minimum Power (dBm)	-19.4304	-15.1302	-16.2459	-15.8928	-16.837	-14.9589	-16.3686	-15.0286
Average Power (dBm)	-1.6807	-2.91187	-4.1792	-1.84364	-1.76628	-1.57182	-2.42397	-2.89759
Max/Min Ratio (dB)	21.9785	16.0879	16.1957	23.0852	24.5797	22.843	22.6598	20.3602
Max/Avg Ratio (dB)	4.22881	3.86955	4.12897	9.0361	9.50901	9.45593	8.71517	8.22919
Min/Avg Ratio (dB)	-17.7497	-12.2183	-12.0667	-14.0491	-15.0707	-13.3871	-13.9447	-12.131
Average Gain (dB)	-2.53618	-3.46692	-4.3993	-2.1682	-1.89842	-1.84211	-2.43342	-2.70682
Note								

3D Peak Gain & Efficiency

	ANT1	
	Peak Gain(dBi)	**Efficiency%**
2.4GHz	**3.16**	**40**
2.45GHz	**4.36**	**53**
2.5GHz	**5.34**	**68**
4.95GHz	**4.46**	**65**
5.15GHz	**5.24**	**66**
5.25GHz	**5.31**	**69**
5.35GHz	**4.97**	**69**
5.725GHz	**3.92**	**67**
5.85GHz	**4.06**	**65**

	ANT2	
	Peak Gain(dBi)	**Efficiency%**
2.4GHz	**2.55**	**56**
2.45GHz	**1.00**	**45**
2.5GHz	**-0.05**	**36**
4.9GHz	**7.20**	**61**
5.15GHz	**7.74**	**65**
5.25GHz	**7.88**	**65**
5.725GHz	**6.29**	**57**
5.85GHz	**5.33**	**53**

SPECIFICATION FOR APPROVAL

DOCUMENT: A3132SP001

STYLE： 200℃ 30V

SIZE: 32AWG×1C
SP 7/0.080 1.13㎜

RECOGNIZED:

WONDERFUL HI-TECH CO.,LTD.

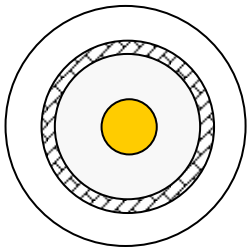
OFFICE：72WU KONG 6TH ROAD,
WU KU IND. DISTRICT
TAIPEI HSIEN,TAIWAN

TEL：(02)22988033
FAX：(02)22988031-2

FACTORY：17 PEI YUAN ROAD,
CHUNG-LI IND. PARK
TAIWAN, R.O.C.

TEL：(03)4527777
FAX：(03)4517214

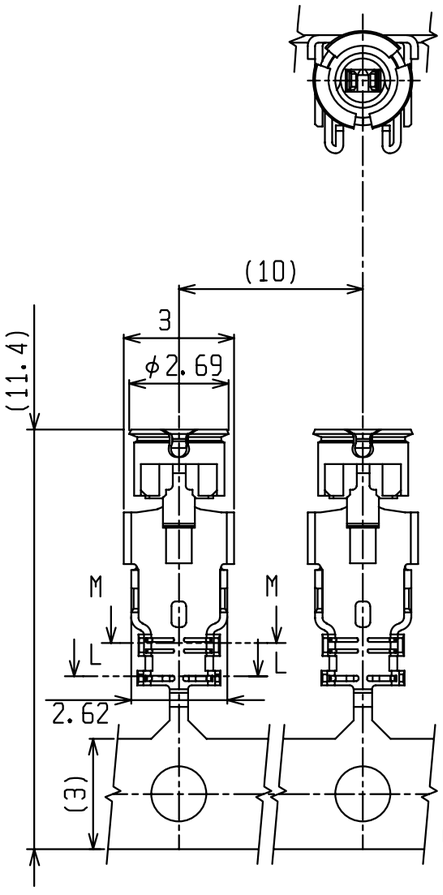
WONDERFUL HI-TECH CO., LTD.
SPECIFICATION

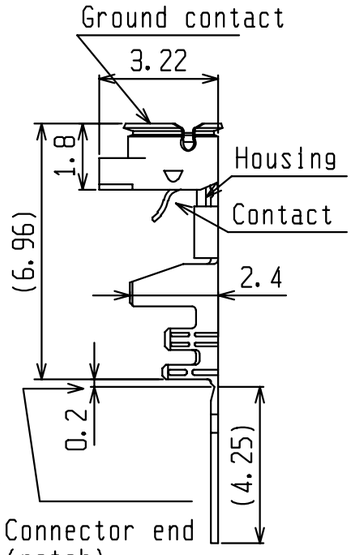
STYLE	200℃ 30V COAXIAL	DOCUMENT NO : A3132SP001	
SIZE	32AWG	ESTABLISHED DATE: 2003/01/16	
STANDARD :			
Conductor	Size	AWG	32
	Material	----	Silver-Coated Copper
	Conductors No.	----	7
	Conductors Size	mm	0.080
	O.D.	mm	0.240
Insulation	Average Thickness	mm	0.22
	Diameter	mm	0.68 ± 0.02
	Material	----	FEP
	Color	----	Clear
Braid	Material	----	Silver-Coated Copper
	Construction	mm	16 / 4 / 0.050
	Coverage	%	90
Jacket	Average Thickness	mm	0.13
	Diameter	mm	1.13 ±0.05
	Material	----	FEP
	Color	----	According to custom
Marking	NON		
Drawing			

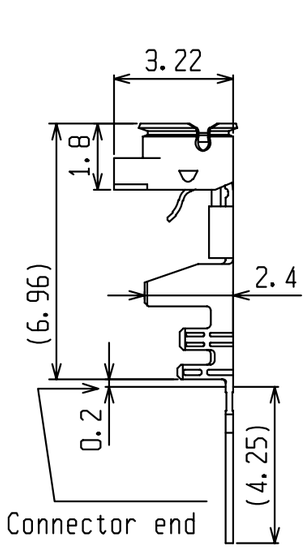
WONDERFUL HI-TECH CO., LTD.
SPECIFICATION

Electrical & Physical Properties							
Item			32AWG				
Rating Temp Voltage			200°C 30V				
Conductor Resistance			545 OHM/KM/20°C MAX.				
Insulation Resistance			100 MEGA OHM/KM MIN.				
Dielectric Strength			AC 1.0 KV/Minute				
Spark Test			0.5 KV				
Insulation	Unaged	Tensile Strength	2500 PSI MIN.(1.76 Kg / mm^2)				
		Elongation	200% MIN.				
	Aged	Tensile Strength	UNAGED MIN. 75%(168HRS×232°C)				
		Elongation	UNAGED MIN. 75%(168HRS×232°C)				
Jacket	Unaged	Tensile Strength	2500 PSI MIN.(1.76 Kg / mm^2)				
		Elongation	200% MIN.				
	Aged	Tensile Strength	UNAGED MIN.75%(168HRS×232°C)				
		Elongation	UNAGED MIN.75%(168HRS×232°C)				
Nom. Impedance			50 ± 3 Ohms				
Nom. Capacitance			96 ± 3 pF/m				
Nom. Vel. of Prop.			69%				
VSWR Test (0 – 6 GHZ)			Less 1.3				
Flame Test			VW-1 OK				
Attenuation (dB/1m)	100MHZ		400MHZ	1.8GHZ	2.4GHZ	5.2GHZ	
	0.60		1.25	2.23	2.70	4.15	

PART NO.
20278-**1R-**

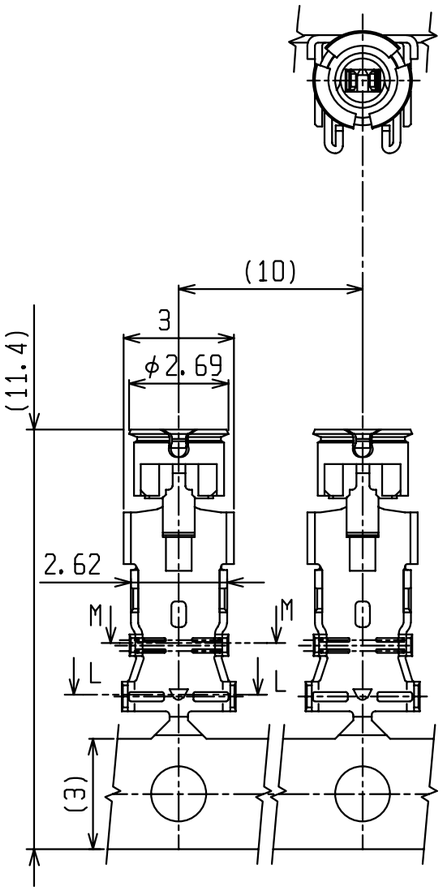


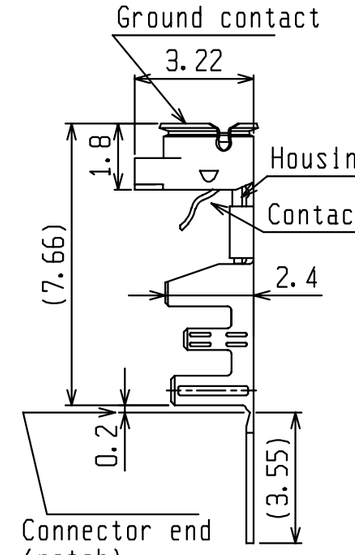


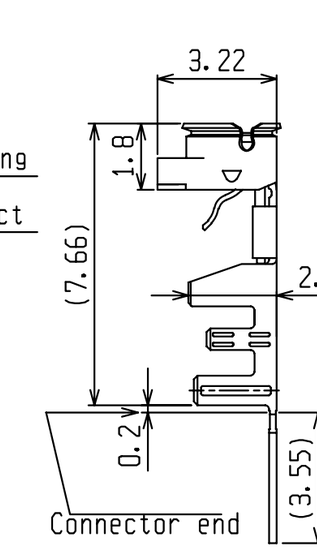


Part No. 20278-101R-08
20278-101R-13
20278-101R-32
For hand tool
(with notch)

Part No. 20278-111R-08
20278-111R-13
20278-111R-32
For semi auto
termination machine
(without notch)







Part No. 20278-101R-18
For hand tool
(with notch)

Part No. 20278-111R-18
For semi auto
termination machine
(without notch)

GENERAL TOLERANCE	
6 MAX.	±0.2
6 OVER MAX. 30	±0.3
30 OVER MAX. 120	±0.5
ANGLE	±2°

REV	ECN	BY	DATE	APP
15C	Z04398	K.O	Nov/12/'04	T.H
14C	Z04339	K.O	Oct/01/'04	T.H
13C	Z3074	A.H	May/22/'03	K.K
12C	Z3052	K.O	Apr/16/'03	K.K

REV	ECN	BY	DATE	APP
11C	Z3041	K.O	Mar/24/03	K.K
10C	Z3014	K.O	JAN/31/03	K.K
9C	Z2239	K.O	NOV/15/02	E.K
8C	Z2224	K.O	OCT/17/02	E.K
7B	Z2180	K.O	JUL/29/02	E.K
6B	Z2146	K.O	JUN/24/02	K.K
5B	Z2117	A.H	MAY/17/02	K.K

REV	ECN	BY	DATE	APP
4	Z2023	K.O	JAN/30/02	E.K
3	Z1256	K.O	NOV/14/01	K.K
2	Z1197	K.O	AUG/27/01	K.K
1	Z1118	K.O	JUN/26/01	K.K
0	Z1109	K.O	JUN/13/01	

REV. RECORD
SERIES No. 2814

DESIGN'D BY	DATE
K.Ohbayashi	JUN/13/01
CHK'D BY	DATE
APP'D BY	DATE
K.Katabuchi	JUN/13/01

I-PEX Interconnect and Packaging Electronics TOKYO, JAPAN

TITLE
MHF series micro coaxial connector plug
vertical (ground contact : gold plating)

CUSTOMER COPY	PROJECTION	SCALE	UNIT	DWG. No.	SHEET	REV.
		6/1	mm	20278	1/3	15C

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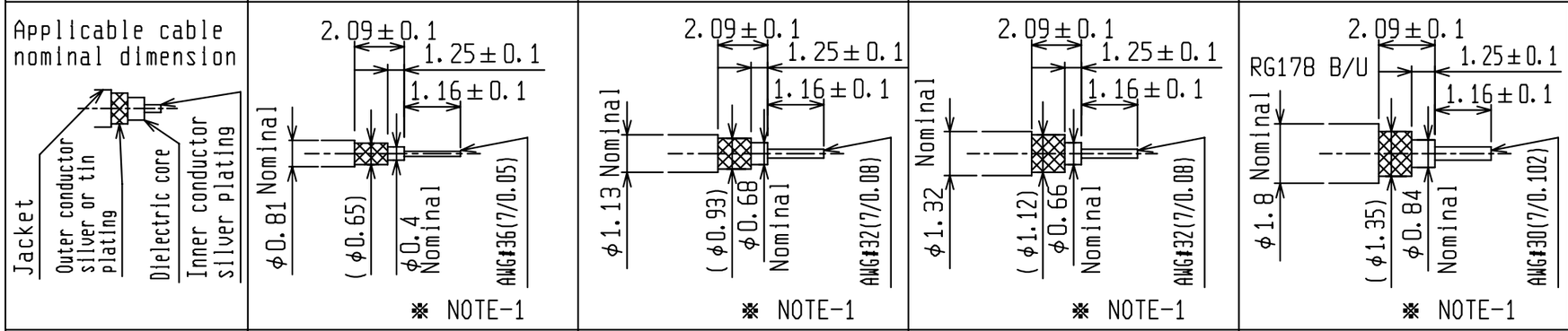
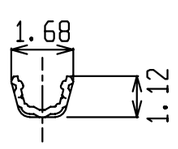
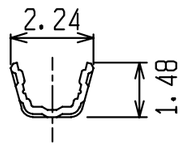
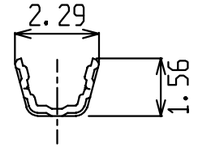
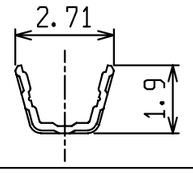
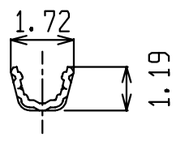
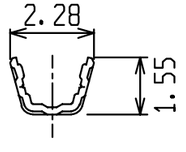
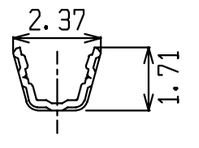
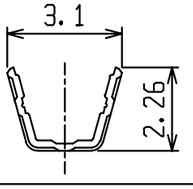
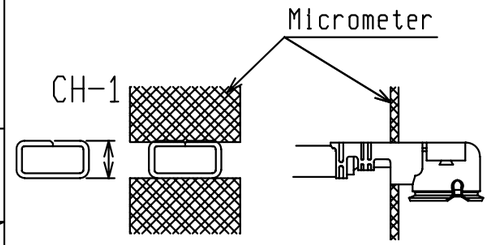
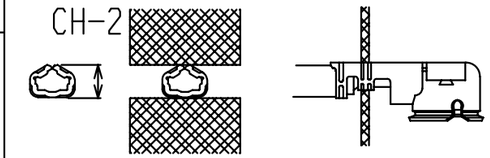
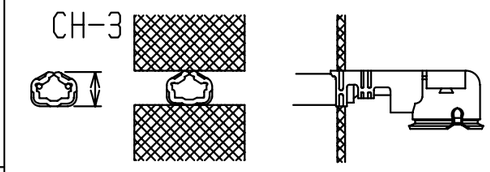
WAS T

Part No.	20278-101R-08 / 20278-111R-08	20278-101R-13 / 20278-111R-13	20278-101R-32 / 20278-111R-32	20278-101R-18 / 20278-111R-18
Housing color	White	Black	Black	White
Applicable cable nominal dimension				
Braided shield of Outer conductor 外部導体の編組	Single / 1重編組	Single / 1重編組	Double / 2重編組	Single / 1重編組
P/N of hand Tool / P/N of semi auto termination machine	90187-008C / 90213-008C	90187-013C / 90213-013C	90187-032C / 90213-032C	90233-018 / 90232-018
Sect. M-M				
Sect. L-L				
Crimp Height CH-1	1.34～1.40	1.34～1.40	1.34～1.40	1.34～1.40
Crimp Height CH-2	0.76～0.84	1.06～1.14	1.20～1.30	1.41～1.49
Crimp Height CH-3	0.85～0.97	1.15～1.35	1.26～1.46	1.70～1.80







Crimp Height

NOTE-1
中心導体，外部導体への半田ｺｰﾃｨﾝｸﾞは不可
Must not use solder coated
inner conductor and outer conductor.

GENERAL TOLERANCE	
6 MAX.	±0.2
6 OVER MAX. 30	±0.3
30 OVER MAX. 120	±0.5
ANGLE	±2°

REV	ECN	BY	DATE	APP

REV. RECORD
SERIES No. 2814

DESIGN'D BY DATE
CHK'D BY DATE
APP'D BY DATE

CUSTOMER COPY
PROJECTION

I-PEX Interconnect and Packaging Electronics TOKYO, JAPAN

TITLE: MHF series micro coaxial connector plug vertical (ground contact : gold plating)

SCALE	UNIT	DWG. No.	SHEET	REV.
-/-	mm	20278	2/3	15C

FORM REV. 4

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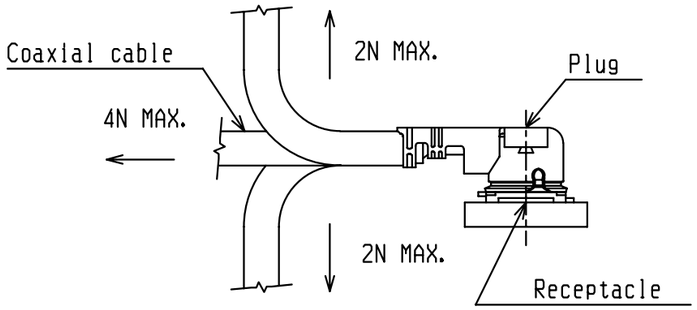
Notes

1. Material
 (1) Housing : PBT , UL94V-0
 (2) Contact
  phosphor bronze
  gold plating 0.1μm MIN.
  over nickel 1.27μm MIN.
 (3) Ground contact
  phosphor bronze
  gold plating 0.05μm MIN.
  over nickel 1.27μm MIN.
2. Packing : reel
3. Mating partner part No.
  : 20279-001E-01
4. Permissible load of cable at mating



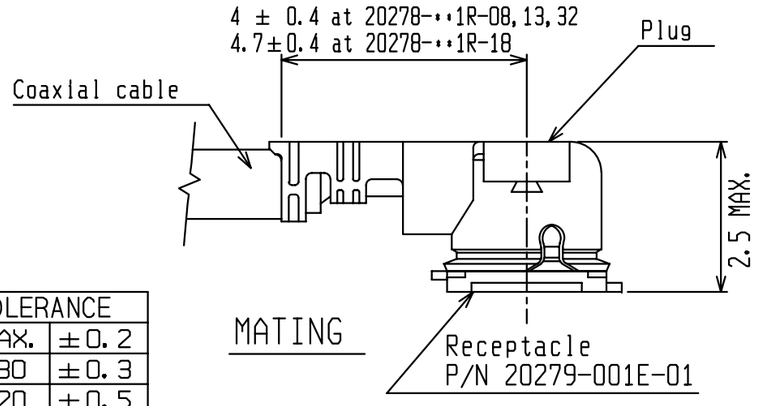
1. 材 料
(1) ハウジング：PBT，UL94V-0
(2) コンタクト
りん青銅
金メッキ0.1μm MIN.
下地 ニッケル1.27μm MIN.
(3) グランドコンタクト
りん青銅
金メッキ0.05μm MIN.
下地 ニッケル1.27μm MIN.
2. 梱包 : リール
3. かん合相手 part No.
:20279-001E-01
4. コネクタかん合後のケーブルに対する荷重

5. Suggestions for mating & unmating operation.

5-1 Mating.
Please mate the connector straightly to vertical direction as much as possible, adjusting the mating axis of plug and receptacle.
As excessive slant angle mating may break the connector , please don't do it.

5. コネクタかん合時および抜去時の注意

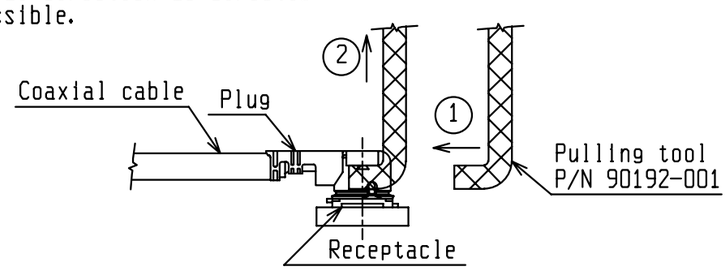
5-1 コネクタ挿入時
PlugとReceptacleのかん合軸を合わせ、できるだけ垂直に挿入して下さい。
極端な斜め挿入は行わないで下さい。
コネクタ破損の原因となりますので、過度なこじり挿抜は行わないで下さい。



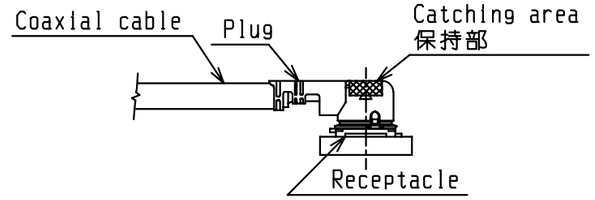
GENERAL TOLERANCE	
6 MAX.	±0.2
6 OVER MAX. 30	±0.3
30 OVER MAX. 120	±0.5
ANGLE	±2°

5-2 Unmating.

(1) In case of unmating by pulling tool.
Please use the pulling tool as the following drawing, and please pull plug to vertical direction as directly as possible.



(2) In case of unmating directly by hand
Please catch the catching area of plug , and please pull plug to vertical direction as directly as possible.



5-3 Crimp over standards of outer conductor

Standards:Less than 10% from total numbers of outer conductor
(Numbers of outer conductor's crimp over from outer conductor's barrel)

5-4 Caution about Heat shrinkage tubes

Please be cureful not to melt housing when using heat shrinkage tubes.
It will become cause of open circuit.

6. This is "Pb-free" connector.

5-2 コネクタ抜去時

(1) 抜去ジグを用いる場合
下図のようにできるだけ垂直に引き抜いて下さい。

(2) 手で直接引き抜く場合
下図の保持部をつかみ，できるだけ垂直に引き抜いて下さい。

5-3 外部導体はみ出し量

外部導体はみ出し量規定
：外部導体トータル本数の10%以下
（外部導体パレルの外にはみ出した量）

5-4 熱収縮チューブについての注意
熱収縮チューブで外部導体を覆う場合は、導通不良の原因になりますので、熱によりハウジグを溶融させないよう注意してください。

6. 本コネクタは"Pb-free"である

REV	ECN	BY	DATE	APP

REV. RECORD
SERIES No. 2814

DESIGN'D BY DATE
CHK'D BY DATE
APP'D BY DATE

CUSTOMER COPY
PROJECTION

I-PEX Interconnect and Packaging Electronics TOKYO. JAPAN

TITLE
MHF series micro coaxial connector plug vertical (ground contact : gold plating)

SCALE	UNIT	DWG. No.	SHEET	REV.
—/—	mm	20278	3/3	15C

FORM REV. 4

WAS T

零件成分表及第三公正單位測試報告

Composition table and 3'rd party test report

組成成份 Composition							模組類(04/0A/0C/0K/17/19/18/0B) Module type(04/0A/0C/0K/17/19/18/0B)	
使用部位 The position for use	原材料名 Raw materials	原材料料號 Material No.	原物料生產廠家 Vendor of Raw material	第三公正單位測試報告 3'rd party test report	原材料顏色 (塑膠、油墨及漆料必填) The color of raw material (Required for plastic, ink and paint)	鍍層存在與否/鍍層材質說明 If the plating layer exist or not?(Y/N)/If yes, please describe the material of the plating layer	是否為組裝到系統後之外露部位 If the module will be exposed outside after system assembly?(Y/N)	Notes
wire	copper	mini 1.13	萬泰	H:\天線\ 天線材質SGS\電線		Y, 鍍錫	N	
	plastic				黑	N	N	
	tin					N	N	
	plastic				透明	N	N	
MHF	CONTACT	20278	I-PEX	H:\天線\ 天線材質SGS\金屬	金	Y, 鍍金	N	
	MHF PULG HOUSING				黑	N	N	
	MHF PULG CONTACT				金	Y, 鍍金	N	
PCB	华金成品板	WPB107	三生	H:\天線\ SGS材質報告\材料	银	Y, 鍍锡	N	
	tin			C:\Documents and Settings\ala	银	Y, 鍍锡	N	
	ink			C:\Documents and Settings\ala		N	N	
	COPPER			H:\天線\ SGS材質報告\材料	金	N	N	
	osp			C:\Documents and Settings\ala		N	N	
	绿漆			C:\Documents and Settings\ala	绿	N	N	
	板材			D:\My Documents\ 生益板材SGS（英文	黄	N	N	
背胶	压缩泡棉	EVA	云裳	C:\Documents and Settings\ala	黑	N	N	
		G9000胶		C:\Documents and Settings\ala	透明	N	N	

Certificate of the Non-Use Hazardous Substances

Please fill in below information 請填寫以下資訊：

Date 日期：2009 / 06 / 17

Vendor code 供應商代號：MC160TW1

Company name 公司名稱：蘇州萬旭電子元件有限公司

(Authorized-person Sign or Seal)

(Company Stamp/公司官)

Company Representative 公司代表人：楊孟均

Company Representative Title 公司代表人職稱：經理

Please Mark ■ Warranty Application 請於適用保證範圍標示■：

■ All "Products" we sold to Pegatron/Unihan 所有我方售予和聯/永碩之"產品"

☐ Pegatron/Unihan Part number 和聯/永碩料號：_____

Vender PN 供應商料號：_____

Pegatron/Unihan Model name 和聯/永碩機種名稱：_____ (OEM/ODM/EMS vendor fill out ONLY 外包商填寫專用)

To Pegatron Corp., Unihan Corp., and their affiliates (collectively "Pegatron/Unihan Group")：

We hereby represent and warrant that the products and components ("Products") we sold to Pegatron/Unihan Group do not contain the level 1 hazardous substances listed in the then current Pegatron/Unihan SPT-00001 document and those indicated in the tables shown below (Table A~C), as well as shall comply with all requirements listed in the then current Pegatron/Unihan GP2-00017 document, including but not limited to design, modification, purchasing, and manufacturing management, as well as the confirming and judging of the test, which the Pegatron/Unihan Group reserves the right to modify these documents at any time. The aforementioned Products include：[1] Products and all materials of the Products; [2] packaging materials; and [3] all materials used in design, manufacturing and reworking processes. In addition, the information of hazardous substances classified at level 3 should be disclosed when these substances are intentionally used in the said Products. This certificate is applied to requirement(s) as below:

此致和碩聯合科技(股)公司/永碩聯合國際(股)公司及其關係企業("和聯/永碩集團")：

我們特此代表並保證所有售予和聯/永碩集團之產品及零組件("產品")，皆不含有當時和聯/永碩 SPT-00001 文件中所列的一級有害物質*以及以下表格內所述之禁用物質(表 A~C)，並且遵守當時和聯/永碩 GP2-00017 文件中所列之各項要求，包括但不限於設計、變更、採購、生產管理及確認測定及判定，上述文件和聯/永碩集團保留隨時修改的權利。前述所提及的產品包含：[1]產品或產品所使用到的所有原物料；[2]包裝材料；[3]設計、生產及重工過程中所使用到的所有原物料；此外，若前述提及之產品中刻意添加三級有害物質，則須揭露資訊。

Customer I.D 客戶別：10

■ General HSF requirement. (Table A and B) 一般 HSF 要求(Table A and B)

☐ HF requirement (Table C) HF 要求 (Table C)

■ Environmental labeling requirement, please fill in 環保標章要求，請填寫：EPEAT (Table D)

☐ Other 其他：N.A.

We further agree to indemnify and hold Pegatron/Unihan Group and their officers, directors, employees, successors and assigns, harmless from and against any losses, damages, claims, demands, suits, liabilities and expenses (including reasonable attorneys' fees and court costs) arising out of or resulting from any lawsuit, judicial action, or similar proceeding for any breach of the foregoing warranty

我們進一步同意賠償和使和聯/永碩集團及其集團人員，包括高級主管、董事、員工、代理人、繼承者和受讓人，不受任何起因於我方違反前項保證所致之任何訴訟、司法上行為或類似行為而受有損失、損害、求償、請求、訴訟、責任及費用(包括合理的律師費用和法院費用)。

***** If the Product contains the hazardous substances defined as the exemptions in SPT-00001, please check the appropriate box in the Appendix. (OEM/ODM/EMS vendor fill out ONLY)**.**

*若您是外包商且產品所含有害物質屬於 SPT-00001 所定義之除外項目，請勾選附件之選項(零件供應商免填)。

Remarks 備註：

Table A. General Product Content Restrictions

Substance/item	Threshold weight % (ppm)	Section containing details and exemptions
Asbestos	Not present	3.1
Batteries – Mercury	1. Batteries(excluding button cell): 5 ppm 2. Button cell batteries: 20000 ppm 3. Alkaline-manganese button cell batteries: 25 mg/per battery or 20000 ppm 4. Alkaline zinc and manganese batteries (except button cells): 1 ppm 5. Products, parts and components must not contain mercuric oxide batteries	3.2.1
Batteries - Cadmium	10 ppm	3.2.2
Batteries – Lead (nonrechargeable)	2000 ppm	3.2.3
Batteries – Non rechargeable Alkaline and Carbon-Zinc Batteries	No threshold - hermetically seal	3.2.4
Batteries - Classification as “Not Restricted” for Transport	Various (see section)	3.2.5
Brominated Flame Retardants (PBBs, PBDEs, including DecaBDE)	1000 ppm	3.3.1
Brominated Flame Retardants (all BFRs in external case plastic parts)	1000 ppm	3.3.2
Brominated Flame Retardants	900 ppm	3.3.3
Cadmium and its compounds	100 ppm	3.4
Certain Azo Colorants	30 ppm	3.5
Chlorinated Hydrocarbons	1000 ppm	3.6
Chlorinated Paraffins	1000 ppm	3.7
Formaldehyde	1.Wooden materials: 0.05 ppm 2.Textile materials: 75 ppm	3.8.1 3.8.2
Hexavalent-Chromium (Cr^{6+}) Compounds	1. In metallic applications: not present 2. In non-metallic applications: 1000 ppm	3.9.1 3.9.2
Lead and its compounds	1. Lead and its compounds: 1000 ppm 2. Lead carbonates and sulfates in paint: 100 ppm 3. Lead in Polyvinyl Chloride (PVC) coating of external cables, wires and cords: 300 ppm	3.10.1 3.10.2 3.10.3
Mercury and its compounds	1000 ppm	3.11
Nickel on external surfaces	Nickel on external surfaces 0.5ug/cm2/week	3.12
Ozone Depleting Substances (ODS)	Not used or present	3.14

Polycyclic Aromatic Hydrocarbons (PAH)	Various (see section)	3.15
Perfluorooctane sulfonates (PFOS) in parts	1000 ppm	3.16.1
Perfluorooctane sulfonates (PFOS) in preparations	50 ppm	3.16.2
Polychlorinated Biphenyls (PCBs) and Polychlorinated Terphenyls (PCTs)	50 ppm	3.17
Polychlorinated Naphthalenes	5 ppm	3.18
1. Polyvinyl Chloride (PVC) in external case plastic parts 2. Polyvinyl Chloride (PVC)	1. Not used 2. 900 ppm	3.19.1 3.19.2
Radioactive Substances	Not present	3.20
Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)	5 ppm	3.21

Noted:

1 Asbestos: Asbestos must not be present in parts, components, materials or products.

2 Battery Requirements

The battery requirements below do not apply at the homogeneous material level, and apply at the weight of the battery.

3.2.1 Mercury in Batteries

3.2.1.1 Batteries must not contain mercury exceeding 0.0005% (5 ppm) by weight. Button cell batteries and batteries composed of button cell batteries, with a mercury content of no more than 2% (20,000 ppm) by weight, are not subject to this requirement.

3.2.1.2 Alkaline zinc and manganese batteries (except button cells) must not contain more than 0.0001% (1 ppm) mercury by weight. The total mercury content of alkaline-manganese button cell batteries must not exceed 25 milligrams of mercury per button cell or 2% (20,000 ppm) by weight, whichever is less.

3.2.1.3 HP products, parts, and components must not contain mercuric oxide batteries.

3.2.2 Cadmium in Batteries: The total cadmium content of batteries must not exceed 0.001% (10 ppm) by weight.

3.2.3 Lead in Batteries: Nonrechargeable type batteries must not contain lead exceeding 0.2% (2000 ppm) by weight.

3.2.4 Nonrechargeable Alkaline and Carbon-Zinc Batteries: Nonrechargeable alkaline and carbon-zinc batteries must be hermetically sealed.

3.2.5 Battery Classification as "Not Restricted" for Transport

All batteries must meet all applicable design, manufacture, marking, testing, and other battery-specific requirements necessary to be classified as "Not Restricted" for purposes of transport for all modes of transportation, as defined in the following documents:

. United States, "Hazardous Materials Regulations," Title 49, Code of Federal Regulations, US Department of Transportation (DOT)

. International Civil Aviation Organization (ICAO), "Technical Instructions for the Safe Transport of Dangerous Goods by Air"

. International Air Transport Association (IATA), "Dangerous Goods Regulations"

Documentation, such as a Material Safety Data Sheet [MSDS] or Product Data Sheet [PDS] that demonstrates compliance to these regulations must be supplied to HP upon request.

3.2.5.1 Lead-Acid Batteries. Rechargeable sealed lead-acid batteries must meet dangerous goods transport criteria for nonspillable batteries as specified in ICAO/IATA Packaging Instruction 806 and Special Provision A67, and must be tested at 55°C (130°F) to ensure no free liquid flows from the case when it is cracked or ruptured. The batteries also must not contain any free or unabsorbed liquid. In addition to the labeling requirements in section 4 of this document, the words "NONSPILLABLE" or "NONSPILLABLE BATTERY" must be marked on the battery and the outside packaging.

3.2.5.2 Lithium Metal and Lithium Ion Cells, Batteries, and Battery Packs. Each lithium metal or lithium ion cell, battery, or battery pack (including lithium metal, lithium alloy, lithium ion, lithium polymer, and equivalent lithium content cells, batteries, or battery packs) must meet the product content, testing, and related requirements specified in the HP specification *HP Requirements for Lithium Metal and Lithium Ion Cells, Batteries, and Battery Packs* [pdf].

3 Brominated Flame Retardants

3.3.1 Parts, components, materials, and products must not contain flame retardants that are polybrominated biphenyls (PBBs) or polybrominated diphenyl ethers (PBDEs), including Decabromobiphenyl Ether (DecaBDE), also known as polybrominated biphenyl ethers (PBBEs) and polybrominated biphenyl oxides (PBBOs), in concentrations greater than or equal to 0.1% (1000 ppm) by weight in any homogeneous material. PBBs and PBDEs restricted under this section include, but are not limited to, those listed in Table 2.

3.3.2 External case plastic parts of products (parts visible to the customer in normal product operation) must not contain Tetrabromobisphenol–A (TBBP-A, CAS# 79-94-7), or any other brominated flame retardants, in concentrations greater than or equal to 0.1% (1000 ppm) by homogenous material weight. This requirement does not apply to printed circuit board base materials or printed circuit assemblies.

3.3.3 When specified in HP product and component specifications, organobromine compounds in the form of flame retardants must not be used in parts, components, materials, or products in concentrations equal to or greater than 0.09% (900 ppm) by weight in any homogeneous material.

3.4 Cadmium

Cadmium and its compounds must not be used in parts, components, materials, or products in concentrations greater than 0.01% (100 ppm) by weight in any homogeneous material. This requirement includes cadmium and its compounds in pigments, dyes, stabilizers, plating, and paints, but does not apply to cadmium in the following applications:

3.4.1 Cadmium in optical and filter glass

3.4.2 Cadmium and its compounds in the plating on the mating surfaces of electrical contacts in connectors

More restrictive limits apply when this substance is used in packaging and batteries. Refer to the HP Packaging Requirements and section 3.2 of this standard.

3.5 Certain Azo Colorants

Azo colorants must not be used in HP products made from textiles or leather (such as carrying cases and protective covers) in concentrations greater than or equal to 0.003% (30 ppm) by weight in any homogeneous material, where the substance may come in prolonged direct contact with exposed skin. Restricted substances released by azo colorants are listed in Table 1.

3.6 Chlorinated Hydrocarbons

The chlorinated hydrocarbons listed in Table 3 must not be contained in any parts, components, materials or products in concentrations greater than or equal to 0.1% (1000 ppm) by weight in any homogeneous material.

3.7 Chlorinated Paraffins

Short Chain Chlorinated Paraffins (SCCPs) including, but not limited to, those identified by CAS numbers 63449-39-8 and 85535-84-8, must not be used or contained in softeners in paints, coatings and sealants; in oils; or in flame-retardants in rubber, plastic and textiles, in concentrations greater than or equal to 0.1% (1000 ppm) by weight in any homogeneous material.

3.8 Formaldehyde

3.8.1 Formaldehyde must not be used in textile materials intended for skin contact greater than 0.0075% (75 ppm) by weight in any homogeneous textile material.

3.8.2 Formaldehyde must not exceed the emissions requirements as defined in Tables 1 and 2 in the *Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products*, sections 93120-93120.12, title 17, California Code of Regulations. This requirement applies to wooden materials, pallets, wood packaging made of plywood, pressed wood, and fiber board after 31 December 2008.

3.9 Hexavalent Chromium

3.9.1 Metallic applications: Hexavalent chromium and its compounds must not be present in any concentration in metallic applications (such as corrosion preventative coatings and conversion coatings).

3.9.2 Non-metallic applications: Hexavalent chromium and its compounds must not be present in concentrations greater than 0.1% (1000 ppm) by weight in any homogeneous material in non-metallic applications (such as paints, pigments, and plastics).

HP-approved test methods are listed in Table 8.

More restrictive limits apply when this substance is used in packaging. Refer to the HP Packaging Requirements.

3.10 Lead

3.10.1 Lead and its compounds must not be used in parts, components, materials, or products in concentrations greater than 0.1% (1000 ppm) by weight in any homogeneous material. This requirement does not apply to lead in the following applications:

3.10.1.1 Lead in glass of cathode ray tubes, electronic components and fluorescent tubes

3.10.1.2 Lead as an alloying element in steel containing up to 0.35% lead by weight

3.10.1.3 Lead as an alloying element in aluminum containing up to 0.4% lead by weight

3.10.1.4 Lead as an alloying element in copper containing up to 4% lead by weight

3.10.1.5 Lead in high melting temperature type solders (such as lead-based solder alloys containing 85% or more lead by weight)

3.10.1.6 Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signaling, transmission, and network management for telecommunications

3.10.1.7 Lead in electronic ceramic parts (for example, piezoelectronic devices)

3.10.1.8 Lead in lead-bronze bearing shells and bushes

3.10.1.9 Lead used in compliant pin connector systems

3.10.1.10 Lead as a coating material for the thermal conduction module c-ring

3.10.1.11 Lead in optical and filter glass

3.10.1.12 Lead in solders consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80% and less than 85% by weight

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

3.10.1.14 Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCDs)

3.10.1.15 Lead oxide in plasma display panels and surface conduction electron emitter displays used in structural elements, notably in the front and rear glass dielectric layer, the bus electrode, the black stripe, the address electrode, the barrier ribs, the seal frit and frit ring, and in print pastes.

3.10.1.16 Lead as impurity in RIG (rare earth iron garnet) Faraday rotators used for fiber optic communications systems.

3.10.2 **Lead in Paint.** Lead carbonates and sulfates must not be used in any paint applied to parts, components, materials, or products in concentrations greater than 0.01% (100 ppm) by weight in the paint.

3.10.3 **Lead in Polyvinyl Chloride (PVC) Coating for External Cables, Wires and Cords**. The concentration of lead (Pb) in the PVC coating (outer jacket) of external PVC coated cables, wires or cords must not exceed 0.03% (300 ppm) by weight in any homogeneous material. This requirement applies to the PVC coating (outer jacket) of external PVC coated cables, wires or cords, including connectors and plugs, in any of the following parts, components, and products:

- Computer mouse, roller ball, and joystick cords
- Computer peripheral wires and cables, AC adapter cords, interface cables and PCMCIA card cords for portable computers or portable peripheral devices
- Computer peripheral wires and cables designed to plug into portable devices, computers and the front of desktop computers (for example, USB cords)
- Computer speaker cords used with portable computers
- Computer power/patch/pin cords designed to plug into the front of desktop computers
- External CD/DVD and tape drives for portable computers
- Laptop and notebook computer cords
- USB, FireWire, telephone, modem, LAN and other cables, wires and cords designed for and used with portable products including, but not limited to:
  - Cell phones
  - GPS devices
  - Handheld PCs and Personal Digital Assistants (PDAs)
  - Portable digital imaging equipment (cameras and web cams)

. Portable CD and DVD players
. Portable scanners
. Portable projectors
. Portable printers
. Portable audio and video players
. Portable storage devices including hard disk drives, media drives, solid state storage devices, ZIP drives, and so forth; and related accessories
. Portable computer input devices including handheld mice, touch pads, keypads, and graphic input tablets

More restrictive limits apply when this substance is used in packaging.

3.11 Mercury

Mercury and its compounds must not be used in parts, components, materials, or products (including switches, relays or electrical contacts) in concentrations greater than 0.1% (1000 ppm) by weight in any homogeneous material. This requirement does not apply to mercury in the following applications:

3.11.1 Mercury in compact fluorescent lamps not exceeding 5 mg per lamp

3.11.2 Mercury in straight fluorescent lamps for general purposes not exceeding 10 mg in halophosphate lamps

3.11.3 Mercury in straight fluorescent lamps for general purposes not exceeding 5 mg in triphosphate lamps with normal lifetime

3.11.4 Mercury in straight fluorescent lamps for general purposes not exceeding 8 mg in triphosphate lamps with long lifetime

3.11.5 Mercury in straight fluorescent lamps for special purposes (such as scanner bulbs and backlit displays)

3.11.6 Mercury in other lamps not specifically mentioned in this list (such as projector lamps and digital projector TVs)

More restrictive limits apply when this substance is used in packaging and batteries. Refer to the section 3.2 of this standard.

3.12 Nickel

Nickel finishes that release greater than 0.5 µg/cm2/week must not be used on the external surface of any product designed to be frequently handled or carried by the user (or intended to be in direct and prolonged skin contact). Measurement to be performed using EN 1811:1998.

3.13 RoHS Compliance

All parts, components, and materials used in electrical and electronic products must comply with the European Union's Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment, as amended from time to time, ("RoHS" Directive) and similar regulations that may be adopted by other countries, States or regions. Refer to the following sections of this document for HP substance-specific requirements and supplier verification requirements:

Section 3.3.1 Brominated Flame Retardants

Section 3.4 Cadmium and its compounds

Section 3.9 Hexavalent chromium and its compounds

Section 3.10 Lead and its compounds

Section 3.11 Mercury and its compounds

Section 4 Supplier Verification

3.14 Ozone Depleting Substances (ODS)

ODSs listed in Table 4, Table 5 and Table 6 must not be present in any parts, components, materials, or products or used in the manufacturing process of any parts, components, materials or products. This requirement does not apply to use of these substances in refrigeration units used in manufacturing facilities or in data center facilities.

3.15 Polycyclic Aromatic Hydrocarbons (PAH)

When specified in HP product and component specifications, PAHs must not be used in the external surfaces of the products listed in the product categories 2 and 3 below in concentrations greater than the limits defined within each product category by weight in any homogeneous material. Measurements are to be performed using methods identified in ZEK 01-08.

Product category 1: Product category 1 does not apply to HP products.

Product category 2:

. External cases for portable devices (Notebook PCs, portable printers)
. Desktop keyboard and mouse
. Portable computer input devices including handheld mice, touch pads, keypads, and graphic input tablets

. External Power Supplies for portable devices
. Cables for portable devices (including power cords and interconnect cables, and so forth)

Product category 2 PAH limits:

. Benzo[a]pyren: 1 mg/kg
. Sum 16 PAH (EPA): 10 mg/kg

These limits apply to material with foreseeable contact to skin for longer than 30 seconds (long-term skin contact)

Product category 3:

. External cases for stationary devices (printers, PCs, and so forth)
. Desktop PCs
. Monitors
. External Power Supplies for stationary devices
. Power Cables for stationary devices

Product category 3 PAH limits:

. Benzo[a]pyren: 20 mg/kg
. Sum 16 PAH (EPA): 200 mg/kg

The limits apply to material with foreseeable contact to skin up to 30 seconds (short-term skin contact) or without skin contact.

3.16 Perfluorooctane sulfonates

3.16.1 Perfluorooctane sulfonates (PFOS, CAS# 1763-23-1) must not be used in concentrations equal to or greater than 0.1% (1000 ppm) by weight in parts, components, or products.

3.16.2 Perfluorooctane sulfonates (PFOS, CAS# 1763-23-1) must not be used in concentrations equal to or greater than 0.005% (50 ppm) by weight in preparations.

The requirements in sections 3.16.1 and 3.16.2 do not apply to the following applications or processes:

. Photoresists or antireflective coatings for photolithography processes
. Photographic coatings applied to films, papers, or printing plates
. Mist suppressants for nondecorative hard chromium (VI) plating
. Wetting agents for use in controlled electroplating systems

3.17 Polychlorinated Biphenyls (PCBs) and Polychlorinated Terphenyls (PCTs)

Polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs) must not be used in concentrations greater than 0.005% (50 ppm) by weight in preparations.

3.18 Polychlorinated Naphthalenes (more than 3 chlorine atoms)

Polychlorinated Naphthalenes (more than 3 chlorine atoms) must not be present in parts, components, materials, or products in concentrations greater than or equal to 0.0005% (5 ppm) by weight in any homogeneous material.

3.19 Polyvinyl Chloride (PVC)

3.19.1 PVC must not be used in the external case plastic parts of products (parts visible to the customer in normal product operation). This restriction does not apply to the sheathing of wires and cables, plastic parts weighing less than 25 grams, to protective product covers, or to display screens for projection.

3.19.2 When specified in HP product and component specifications, organ chlorine compounds in the form of polyvinyl chloride or polyvinyl chloride congeners must not be used in parts, components, materials, or products in concentrations equal to or greater than 0.09% (900 ppm) by weight in any homogeneous material.

3.20 Radioactive Substances

Radioactive substances must not be present in parts, components, materials or products listed in Table 8.

3.21 Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

TBTs, TPTs, and TBTOs listed in Table 7 must not be used in parts, components, materials or products in concentrations greater than or equal to 0.0005% (5 ppm) by weight in any homogeneous material

Table 1 - Azo Colorants

Note that the EC azo colorant restriction applies to certain azo colorants that by reductive cleavage of azo groups may release one of the following 22 aromatic amines

Name	CAS Numbers
biphenyl-4-ylamine	92-67-1
benzidine	92-87-5
4-chloro-o-toluidine	95-69-2
2-naphthylamine	91-59-8
o-aminoazotoluene	97-56-3
5-nitro-o-toluidine	99-55-8
4-chloroaniline	106-47-8
4-methoxy-m-phenylenediamine	615-05-4
4,4'-methylenedianiline	101-77-9
3,3'-dichlorobenzidine	91-94-1
3,3'-dimethoxybenzidine	119-90-4
3,3'-dimethylbenzidine	119-93-7
4,4'-methylenedi-o-toluidine	838-88-0
6-methoxy-m-toluidine	120-71-8
4,4'-methylene-bis(2-chloroaniline)	101-14-4
4,4'-oxydianiline	101-80-4
4,4'-thiodianiline	139-65-1
o-toluidine	95-53-4
4-methyl-m-phenylenediamine	95-80-7
2,4,5-trimethylaniline	137-17-7
o-anisidine	90-04-0
4-amino azobenzene	

Table 2 - PBBs, PBDEs and PBDOs Prohibited from Products

Name	CAS* Numbers
Bromobiphenyl	2052-07-05, 2113-57-7, 92-66-0
Bromobiphenyl Ether	101-55-3
Decabromobiphenyl	13654-09-06
Decabromobiphenyl Ether	1163-19-5
Dibromobiphenyl	92-86-4
Dibromobiphenyl Ether	2050-47-7
Heptabromobiphenyl	6355-01-8
Heptabromobiphenyl Ether	68928-80-3

Hexabromobiphenyl	59080-40-9, 36355-01-8, 67774-32-7
Hexabromobiphenyl Ether	36483-60-0
Nonabromobiphenyl	27753-52-2
Nonabromobiphenyl Ether	63936-56-1
Octabrombiphenyl	61288-13-9
Octabromobiphenyl Ether	32536-52-0
Pentabromobiphenyl	56307-79-0
Pentabromobiphenyl Ether	32534-81-9
Polybrominated Biphenyl, Polybromobiphenyl(s), Polybromodiphenyl(s)	59536-65-1
Polybrominated Biphenyl Ether, Polybrominated Biphenyl Oxide	No CAS number assigned
Tetrabromobiphenyl	40088-45-7
Tetrabromobiphenyl Ether	40088-47-9
Tribromobiphenyl	51202-79-0
Tribromobiphenyl Ether	49690-94-0

Note: biphenyl is used interchangeably with diphenyl.

Table 3 - Chlorinated Hydrocarbons Prohibited From Products

Name	CAS Numbers
1,1 Dichloroethylene	75-35-4
Pentachloroethane	76-01-7
Methylenechloride	75-09-2
Tetrachloromethane (Carbon Tetrachloride)	56-23-5
1,1,1,2 Tetrachloroethane	630-20-6
1,1,2,2 Tetrachloroethane	79-34-5
Tetrachloroethylene	127-18-4
Trichloromethane (Chloroform)	67-66-3
1,1,2 Trichloroethane	79-00-5
Trichloroethylene	79-01-6
1,1,1-Trichloroethane (TCA)	71-55-6
Bis (chloromethyl) ether	542-88-1
Polychlorinated Phenols such as Pentachlorophenol and its salts	87-86-5
Vinyl Chloride (monomer)	75-01-4

Table 4 - Ozone Depleting Substances and Isomers

Name	CAS Numbers
Trichlorofluoromethane (CFC-11) and its isomers	75-69-4
Dichlorodifluoromethane (CFC-12) and its isomers	75-71-8
Trichlorotrifluoroethane (CFC-113) and its isomers	76-13-1
Dichlorotetrafluoroethane (CFC-114) and its isomers	76-14-2
Monochloropentafluoroethane (CFC-115) and its isomers	76-15-3
Chlorotrifluoromethane (CFC-13) and its isomers	75-72-9 185009-43-2
Pentachlorofluoroethane (CFC-111) and its isomers	354-56-3
Tetrachlorodifluoroethane (CFC-112) and its isomers	76-12-0
Heptachlorofluoropropane (CFC-211) and its isomers	422-78-6 135401-87-5
Hexachlorodifluoropropane (CFC-212) and its isomers	3182-26-1
Pentachlorotrifluoropropane (CFC-213) and its isomers	2354-06-5 134237-31-3
Tetrachlorotetrafluoropropane (CFC-214) and its isomers	29255-31-0 2268-46-4
Trichloropentafluoropropane (CFC-215) and its isomers	1599-41-3 4259-43-2 76-17-5
Dichlorohexafluoropropane (CFC-216) and its isomers	661-97-2
Chloroheptafluoropropane (CFC-217) and its isomers	422-86-6
Bromochlorodifluoromethane (Halon-1211) and its isomers	353-59-3
Bromotrifluoromethane (Halon-1301) and its isomers	75-63-8
Dibromotetrafluoroethane (Halon-2402) and its isomers Carbon tetrachloride	124-73-2
1,1,1-trichloroethane (methyl chloroform) and its isomers except 1,1,2-trichloroethane	71-55-6
Bromomethane (methyl bromide)	74-83-9
Bromodifluoromethane and its isomers(HBFCs)	1511-62-2
These materials may contain isomers that are not listed here. Isomers with CAS numbers have been included when available	

Table 5 – Hydrochlorofluorocarbons and Isomers

Name	CAS Numbers
Dichlorofluoromethane (HCFC-21)	75-43-4
Chlorodifluoromethane (HCFC-22)	75-45-6
Chlorofluoromethane (HCFC-31)	593-70-4
Tetrachlorofluoroethane (HCFC-121)	130879-71-9
1,1,1,2-tetrachloro-2-fluoroethane	354-11-0
1,1,2,2-tetrachloro-1-fluoroethane	354-14-3
Trichlorodifluoroethane (HCFC-122)	41834-16-6
Trichloro-1,1-difluoroethane	354-21-2
Dichlorotrifluoroethane (HCFC-123)	34077-87-7
Dichloro-1,1,2-trifluoroethane	90454-18-5
2,2-dichloro-1,1,1-trifluoroethane	306-83-2
1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)	354-23-4
1,1-dichloro-1,2,2-trifluoroethane(HCFC-123b)	812-04-4
2,2-dichloro-1,1,2-trifluoroethane(HCFC-123b)	812-04-4
Chlorotetrafluoroethane (HCFC-124)	63938-10-3
2-chloro-1,1,1,2-tetrafluoroethane	2837-89-0
1-chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	354-25-6
Trichlorofluoroethane (HCFC-131)	27154-33-2; 134237-34-63
1-Fluoro-1,2,2-trichloroethane	359-28-4
1,1,1-trichloro-2-fluoroethane (HCFC-131b)	811-95-0
Dichlorodifluoroethane (HCFC-132)	25915-78-0
1,2-dichloro-1,1-difluoroethane (HCFC-132b)	1649-08-7
1,1-dichloro-1,2-difluoroethane(HCFC-132c)	1842-05-3
1,1-dichloro-2,2-difluoroethane	471-43-2
1,2-dichloro-1,2-difluoroethane	431-06-1
Chlorotrifluoroethane (HCFC-133)	1330-45-6
1-chloro-1,2,2-trifluoroethane	1330-45-6
2chloro-1,1,1-trifluoroethane (HCFC-133a)	75-88-7
Dichlorofluoroethane (HCFC-141)	25167-88-8
1,1-dichloro-1-fluoroethane (HCFC-141b)	1717-00-6
1,2-dichloro-1-fluoroethane	430-57-9
Chlorodifluoroethane (HCFC-142)	25497-29-4
1-chloro-1,1-difluoroethane (HCFC-142b)	75-68-3
1-chloro-1,2-difluoroethane (HCFC-142a)	25497-29-4
Hexachlorofluoropropane (HCFC-221)	134237-35-73
Pentachlorodifluoropropane (HCFC-222)	134237-36-83
Tetrachlorotrifluoropropane (HCFC-223)	134237-37-93
Trichlorotetrafluoropropane (HCFC-224)	134237-38-03

Dichloropentafluoropropane, (Ethyne, fluoro-) (HCFC 225)	127564-92-5; (2713-09-9)
2,2-Dichloro-1,1,1,3,3-pentafluoropropane(HCFC 225aa)	128903-21-9
2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC 225ba)	422-48-0
1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225bb)	422-44-6
3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC 225ca)	422-56-0
1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC 225cb)	507-55-1
1,1-Dichloro-1,2,2,3,3-pentafluoropropane(HCFC 225cc)	13474-88-9
1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC 225da)	431-86-7
1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225ea)	136013-79-1
1,1-Dichloro-1,2,3,3,3-pentafluoropropane(HCFC 225eb)	111512-56-2
Chlorohexafluoropropane (HCFC-226)	134308-72-83
Pentachlorofluoropropane (HCFC-231)	134190-48-03
Tetrachlorodifluoropropane (HCFC-232)	134237-39-1
Trichlorotrifluoropropane (HCFC-233)	134237-40-4
1,1,1-trichloro-3,3,3-trifluoropropane	7125-83-9
Dichlorotetrafluoropropane (HCFC-234)	127564-83-4
Chloropentafluoropropane (HCFC-235)	134237-41-5
1-chloro-1,1,3,3,3-pentafluoropropane (HCFC-235fa)	460-92-4
Tetrachlorofluoropropane (HCFC-241)	134190-49-1
Trichlorodifluoropropane (HCFC-242)	134237-42-6
Dichlorotrifluoropropane (HCFC-243)	134237-43-73
1,1-dichloro-1,2,2-trifluoropropane	7125-99-7
2,3-dichloro-1,1,1-trifluoropropane (HCFC-243da)	338-75-0
3,3-dichloro-1,1,1-trifluoropropane	460-69-5
Chlorotetrafluoropropane (HCFC-244)	134190-50-4
3-chloro-1,1,2,2-tetrafluoropropane	679-85-6
Trichlorofluoropropane (HCFC-251)	134190-51-5
1,1,3-trichloro-1-fluoropropanene	818-99-5
Dichlorodifluoropropane (HCFC-252)	134190-52-6
Chlorotrifluoropropane (HCFC-253)	134237-44-8
3-chloro-1,1,1-trifluoropropane	460-35-5
Dichlorofluoropropane (HCFC-261)	134237-45-9
1,1-dichloro-1-fluoropropane	7779-56-6
Chlorodifluoropropane (HCFC-262)	134190-53-7
2-chloro-1,3-difluoropropane	102738-79-4
Chlorofluoropropane (HCFC-271)	134190-54-83
2-chloro-2-fluoropropane	420-44-0
These materials may contain isomers that are not listed here. Isomers with CAS numbers have been included when available.	

Table 6 - Hydrofluorocarbons and Isomers

Name	CAS* Numbers
Fluoroform, Trifluoromethane (HFC-23)	75-46-7
Difluoromethane (HFC-32)	75-10-5
1,1,1,2,3,4,4,5,5,5-decafluoropentane, 2H,3H-Decafluoropentane (HFC-43-10)	138495-42-8
Pentafluoroethane (HFC-125)	354-33-6
1,1,1,2-Tetrafluoroethane, tetrafluoroethane (HFC-134a)	811-97-2
1,1,1-Trifluoroethane (HFC-143a)	420-46-2
1,1-Difluoroethane, difluoroethane (HFC-152a)	75-37-6
1,1,1,2,3,3,3-Heptafluoropropane, heptafluoropropane (HFC-227ea)	431-89-0
1,1,1,3,3,3-hexafluoropropane (HFC-236fa)	690-39-1
1,1,2,2,3-pentafluoropropane (HFC-245ca)	679-86-7
Perfluoromethane,	75-73-0
Perfluoroethane	76-16-4
Perfluorobutane	355-25-9

Table 7 - Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Name	CAS* Numbers
Bis(tri-n-butyltin) oxide	56-35-9
Triphenyltin N,N'-dimethyldithiocarbamate	1803-12-9
Triphenyltin fluoride	379-52-2
Triphenyltin acetate	900-95-8
Triphenyltin chloride	639-58-7
Triphenyltin hydroxide	76-87-9
Triphenyltin fatty acid salts (C=9-11)	47672-31-1
Triphenyltin chloroacetate	7094-94-2
Tributyltin methacrylate	2155-70-6
Bis(tributyltin) fumarate	6454-35-9
Tributyltin fluoride	1983-10-4
Bis(tributyltin) 2,3-dibromosuccinate	31732-71-5
Tributyltin acetate	56-36-0
Tributyltin laurate	3090-36-6
Bis(tributyltin) phthalate	4782-29-0
Copolymer of alkyl acrylate, methyl methacrylate and tributyltin Methacrylate(alkyl; C=8)	No CAS number assigned

Tributyltin sulfamate	6517-25-5
Bis(tributyltin) maleate	14275-57-1
Tributyltin chloride	1461-22-9
Mixture of tributyltin cyclopentanecarboxylate and its analogs (Tributyltin naphthenate)	No CAS number assigned
Mixture of tributyltin 1,2,3,4,4a, 4b, 5,6,10,10a-decahydro-7-isopropyl-1, 4a-dimethyl-1-phenanthlenecarboxylate and its analogs (Tributyltin rosin salt)	No CAS number assigned
Other Tributyl Tins & Triphenyl Tins	No CAS number assigned

Table 8 - Radioactive Substances (Radioactive Isotopes)

Name	CAS* Numbers
Uranium	7440-61-6
Plutonium	7440-07-5
Radon	10043-92-2
Americium	7440-35-9
Thorium	7440-29-1
Cesium (Radioactive Isotopes only)	7440-46-2
Strontium (Radioactive Isotopes only)	7440-24-6

Table B. General Specification for the Environment –Packaging Requirements

Substance/item	Threshold weight % (ppm)
Ozone Depleting Substances	Must not be used in plastic foam packaging materials
Heavy Metals	Lead, mercury, cadmium, or hexavalent chromium greater than 0.01% (100 ppm) by weight.
Polyvinyl Chloride (PVC)	1. Must not be used. 2. This restriction does not apply to protective tape covers with a surface area equal to or less than 15 square centimeters (2.35 square inches) and or weighing less than 1 g (0.035 oz).

Table C. Substance restrictions for halogen-free products and components

Substance/item	Threshold weight % (ppm)
Bromine	≦900 ppm (0.09 wt%)
Chlorine	≦900 ppm (0.09 wt%)
Bromine and Chlorine	≦1500 ppm (0.15 wt%)

Table D. Elimination of intentionally added hazardous substances

Item	Description	Criteria
Elimination of intentionally added cadmium	All covered products shall have concentrations of cadmium less than half the threshold defined in RoHS, unless the presence of cadmium can be shown to be due to use of recycled content.	Less than 50 ppm
Low threshold for amount of mercury used in light sources	All flat panel video display devices shall use lamps that contain a reduced amount of mercury relative to the current industry standard.	3.0mg
Elimination of intentionally added lead in certain applications (Applies to VDUs only)	Video display units shall have concentrations of lead less than 5 percent of the threshold defined in the RoHS Directive per listed part, unless the presence of lead can be shown to be due to use of recycled content.	Less than 50 ppm
Elimination of intentionally added hexavalent chromium	All covered products shall have concentrations of hexavalent chromium that are less than half the threshold defined in the RoHS Directive, unless the presence of hexavalent chromium can be shown to be due to use of recycled content.	Less than 500 ppm
Polyvinyl chloride and chlorinated plastics	In all covered products, except cables and interconnect parts, parts greater than 25 grams shall not contain polyvinyl chloride (PVC).	N.D. (Not Detected)
R45,R46,R50,R51,R52,R60,R61 (European Council Directive 67/548/EEC)	Plastic parts >25 g shall be free from flame retardants (not more than 0.1% of total weight) that are classified as dangerous substances under European Council Directive 67/548/EEC.	Less than 1000 ppm

Appendix 附件

☐ **1.** Cadmium in electrical contacts and the plating of electrical contacts, for which high reliability is required and which has no substitute materials. 鎘用於有高度安全標準或高度可靠度需求之電性接點與鎘鍍層。

☐ **2.** Cadmium in optical glass, filter glass. 鎘用於光學玻璃及濾光玻璃。

☐ **3.** Lead in high-melting temperature type solder for internal connections used for modules, parts and devices. (i.e. lead based alloys containing 85wt% or more) 鉛用於高熔點用途之銲錫(含鉛量在 85 wt%以上之銲錫)。

☐ **4.** Lead in solder for server, storage and storage array system, network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunications. 鉛用於伺服器、儲存器與存取陣列系統和交換、信號產生和傳輸，以及電信網路管理的網路基礎建構設備之銲錫。

☐ **5.** Lead in electronic ceramic parts. (e.g. piezoelectric elements, dielectric ones, and magnetic ones [ferrites]) 鉛用於電子陶瓷零部件，如壓電元件、介電元件及磁性(鐵氧材質)元件等。

☐ **6.** Lead in optical glass, filter glass. 鉛用於光學玻璃、濾光玻璃。

☐ **7.** Lead in glass materials used for modules, electrical parts, cathode-ray tubes, or vacuum fluorescent displays. The glass materials include adhesives, resistor elements, glass frit, conductive pastes (silver or copper ones), and sealing materials. 鉛使用於外購模組、電子零件、陰極射線管或真空螢光顯示器的玻璃材料，包含黏著劑、電阻體、玻璃材質、導電膏(銀膏或銅膏)與密封材料。

☐ **8.** Lead in solder consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80wt% and less than 85wt%. 鉛用於微處理器構裝與接腳間之連接用(含有兩種元素以上)銲錫(鉛含量為 80wt%-85wt%)。

☐ **9.** Lead in solder to complete a viable electrical connection between semiconductor die and carrier within integrated circuit Flip Chip packages. (e.g. solder pastes used under C4 [Controlled Collapse Chip Connection] bumps) 鉛用於覆晶構裝中半導體晶片與承載電路板間電性訊號連接用之銲錫(包含如 C4- Controlled Collapse Chip Connection 銲錫凸塊之錫膏)。

☐ **10.** Lead in lead-bronze bearing shells and bushes. 鉛用於青銅材質之軸承殼及軸襯。

☐ **11.** Lead in a coating material for the thermal conduction module C-ring. 鉛用於熱傳導模組之 C-ring 環組的鍍層材料。

☐ **12.** Lead in the compliant pin connector systems. 鉛用於插接式連接器系統(銲接式連接器除外)，如插接腳之表面鍍層。

☐ **13.** Lead as an alloying element in steel should less than 0.35 wt%. 鋼合金中的鉛允許濃度需在 0.35%以下。

☐ **14.** Lead as an alloying element in aluminum should less than 0.4 wt%. 鋁合金中的鉛允許濃度需在 0.4%以下。

☐ **15.** Lead as an alloying element in copper (including brass and phosphor bronze) should less than 4 wt%. 銅合金(包含黃銅及磷青銅)中的鉛允許濃度需在 4%以下。

☐ **16.** Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCD). LCD 中用於保護平面螢光燈之前後支撐物的玻璃中可含氧化鉛。

☐ **17.** Lead in solders for the soldering to machine through whole discoidal and planar array ceramic multilayer capacitors. 通孔盤狀及平面陣列陶瓷多層電容器焊料所含的鉛。

☐ **18.** Lead alloys as solder for transducers used in high-powered (designated to operate for several hours at acoustic power levels of 125 dB SPL and above) loudspeakers. 在大功率揚聲器中作為轉換器焊料的鉛合金。

☐ **19.** Mercury in lamps other than small-sized fluorescent lamps and straight-tube ones. (e.g. High-pressure mercury lamps). 汞用於小型及直式螢光燈管以外的其他燈管，如高壓汞燈、液晶顯示器背光燈。

☐ **20.** PVC in binders made of resin. PVC 用於樹脂作成之黏合劑。

☐ **21.** PVC in polyvinyl electrical wires for high voltage. PVC 用於高電壓使用聚乙烯電線材。

☐ **22.** PVC in insulating tapes. PVC 用於絕緣膠帶。

☐ **23.** PVC in speaker grilles. PVC 用於揚聲器拖架。

☐ **24.** PVC in power supply cords for import into EU countries. PVC 用於出口至歐洲之電源供應線材。

☐ **25.** PVC in transformer leads of which the joint is fixed by varnish impregnation. PVC 用於接腳部位經清漆浸漬之變壓器。

☐ **26.** PVC in curl cords. PVC 用於捲線。

☐ **27.** PVC in extra fine electrical wires that are AWG (American Wire Gauge) 36 or more. PVC 用於高於 AWG(American Wire Gauge) 36 規格之極細式電線材。

☐ **28.** Use of PVC and PVC blends in the professional-use cables, to which general-purpose ones cannot be applied (e.g. cables for broadcast cameras and microphones). PVC 用於使用聚氯乙烯或聚氯乙烯混合物之專業用途線材(普通線材無法其應用要求)，如廣播電視所使用之攝影機電線材、麥克風電線材等。

☐ **29.** PFOS in mist suppressants for nondecorative hard chromium (VI) plating and wetting agents for use in controlled electroplating systems. 全氟辛烷硫磺酸(PFOS)用於電鍍鉻抑制劑及濕潤劑。

☐ **30.** Cadmium, lead, mercury and hexavalent chromium in cartons for returnable boxes owed by modules and parts suppliers. 鎘、鉛、汞及六價鉻用於外購模組及零部件供應商使用之可回收產品搬運箱。

☐ **31**. 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. 使用於聲壓大於或等於 100 分貝的高功率音箱中的音圈轉換器上的電導體的電子或機械焊點中的鎘合金。

☐ **32.** Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting). 於無汞平面螢光燈(使用於液晶顯示器、設計或工業照明設備)中焊錫內含的鉛。

☐ **33**. Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes. 封裝氬和氪雷射管的氧化鉛。

Appendix

Antenna Specification
(Antenna#2 UCW2620)

納入仕様書

《新規．變更》

客戶 PEGATRONCORP

制　　定	2009 年 09 月 16 日
部品番號	1415-00XS000
品　　名	WPB127 Mini 1.13(Gray) Antenna with MHF L230mm
公司番號	UCW2620

［驗收印欄］

蘇州萬旭電子元件有限公司
江蘇省蘇州市相城區望亭鎮問渡路168號
PC:215155
TEL:86-512-65381105
FAX:86-512-65381104

作　成	檢　圖	確　認	核　準
曹 吉	張永明	谭秋菊	陆晓东

SPECIFICATION

Description……..: WPB127 Mini 1.13(Gray) Antenna with MHF L230mm

2.Customer……..: PEGATRONCORP
3.Part No…….: 1415-00XS000
4.Coaxial Lenght…….:230mm(see Drawing)
5.Electrical Characteristics
Operating Frequency……..…….: 2~6GHz
Impedance……..…….: 50 Ohm nominal

2.4 Operating Temp,Ex…….…..…:-20℃ ~ +65℃

2.5 Storage Temp,Ex……:-30℃ ~ +75℃

6.Mechanical Chararteristics
Connector……...:MHF

7.Raw Material
Coaxial Cable…….: Mini 1.13
Core……: ND

變更記錄 1.

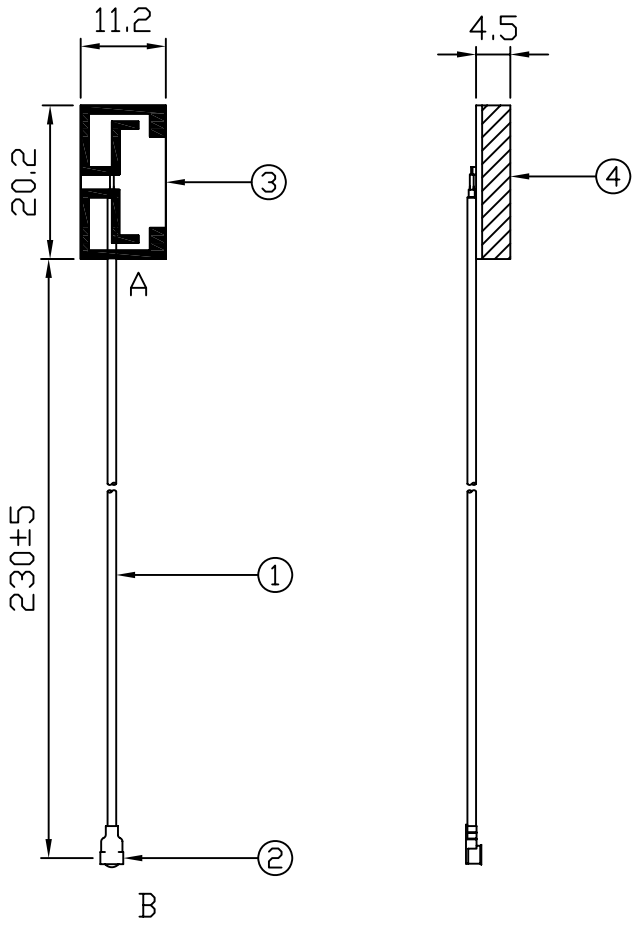
2.

3.

TOLERANCES:

X	±0.3
X.X	±0.2
X.XX	±0.1
ANGULAR	±5.0°

制造厂：2F



作業說明：

1. 天線組立依據天線組立作業標準指導書規定製作。
   依據QC管理工程圖，執行品質管制。

NO	材料名稱	環材	廠商	零件規格	顏色	切斷尺寸	用量
4	压缩泡棉	V		EVA压缩泡棉 9mm*19mm*3.6T 黑 HF	黑		1
3	WPB	V		WPB127 HF	黑		1
2	MHF Connector	V		20278-111R-13 LF	銀		1
1	MINI 1.13 Coaxial Cable	V		MINI RG OD:1.13 浅灰（GY-193）LF HF	浅灰		1

第3角法	圖面不用實測					部品番號	1415-00XS000
比例: FREE	作成	檢圖	確認	核准			
單位: mm	曹吉	张永明	谭秋菊	陆晓东		品名	WPB127 Mini 1.13(Gray) Antenna with MHF L230mm
09年09月16日						公司番號	UCW2620

成品電腦編號 HY1A17268A

蘇州萬旭電子元件有限公司

Wanshih Electronic Co., LTD

Research & Development Department

Antenna Measurement

CUSTOMER:UNIHAN

ANT BANDWIDTH :2.4-2.5,5.15-5.35,5.725-5.875GHz

TEST INSTRUMENT：1. AGILENT E5071B NETWORK ANALYZER

2.Sporton ETS OTA Chamber

ENGINEER：Puma Lu

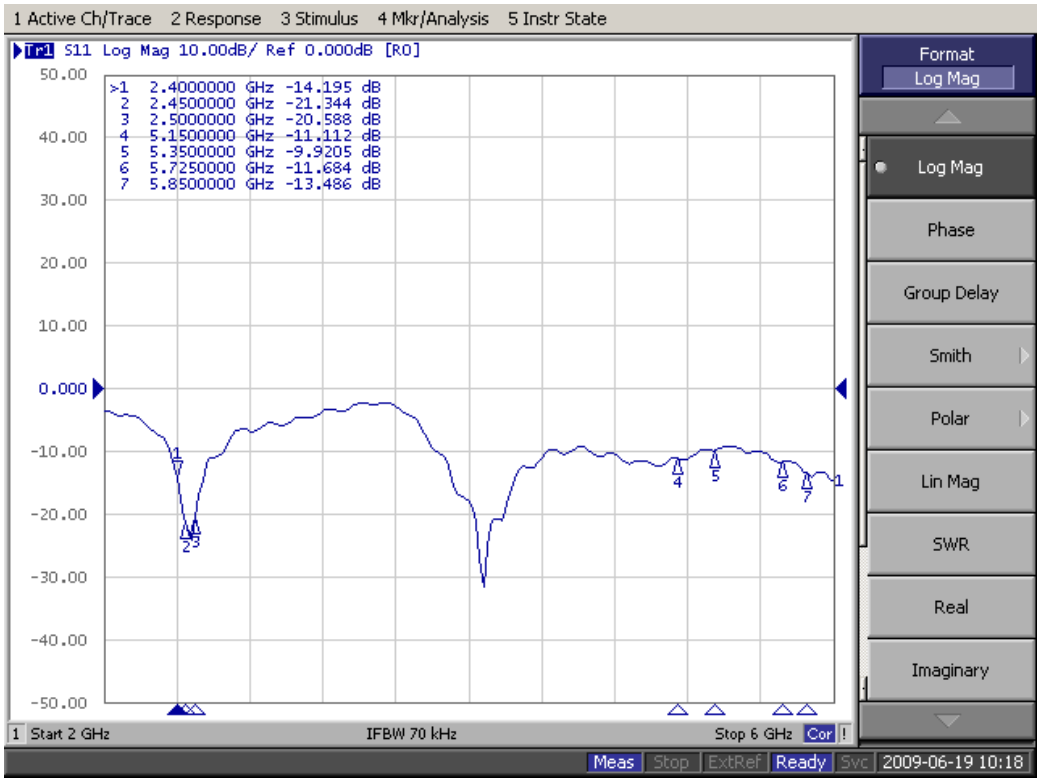
DATE：2009/06/19

HOUSING

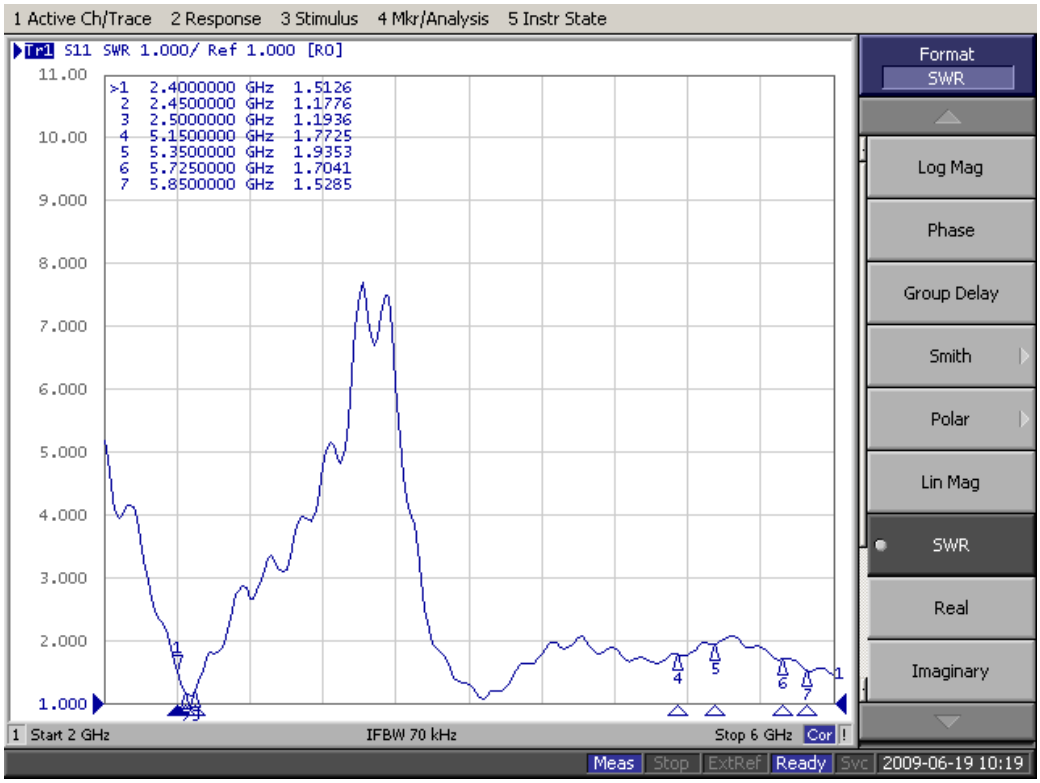
LOCATION OF ANTS

ANT 1

RETURN LOSS:

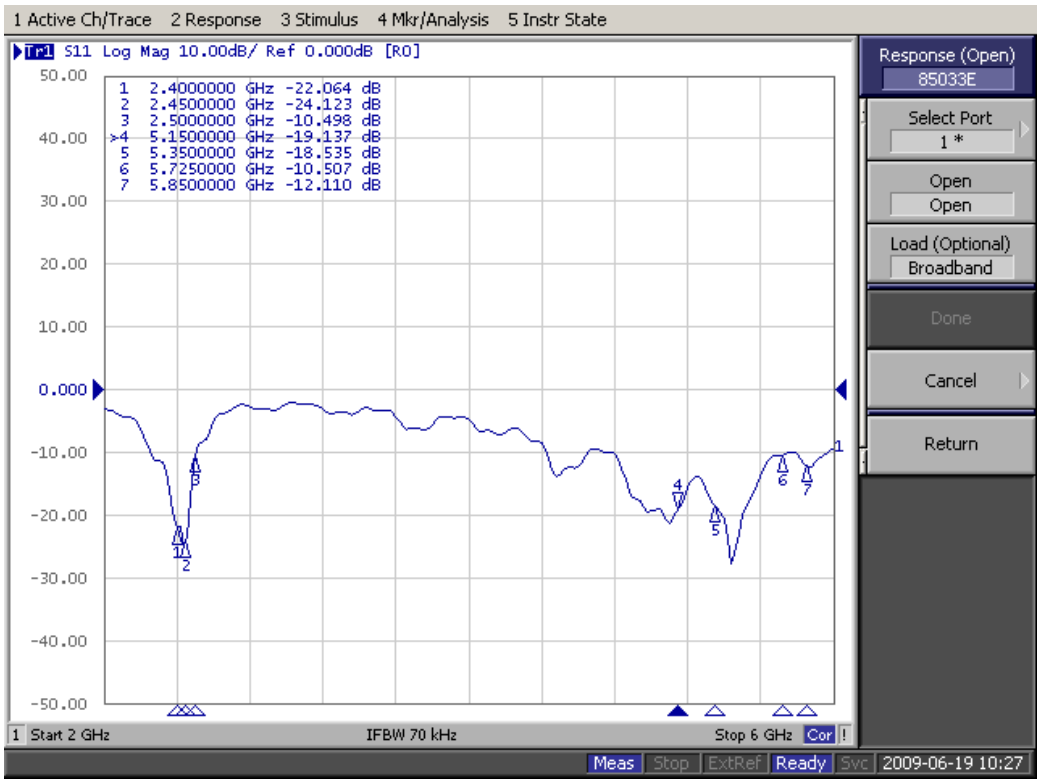


SWR:



ANT 2

RETURN LOSS:



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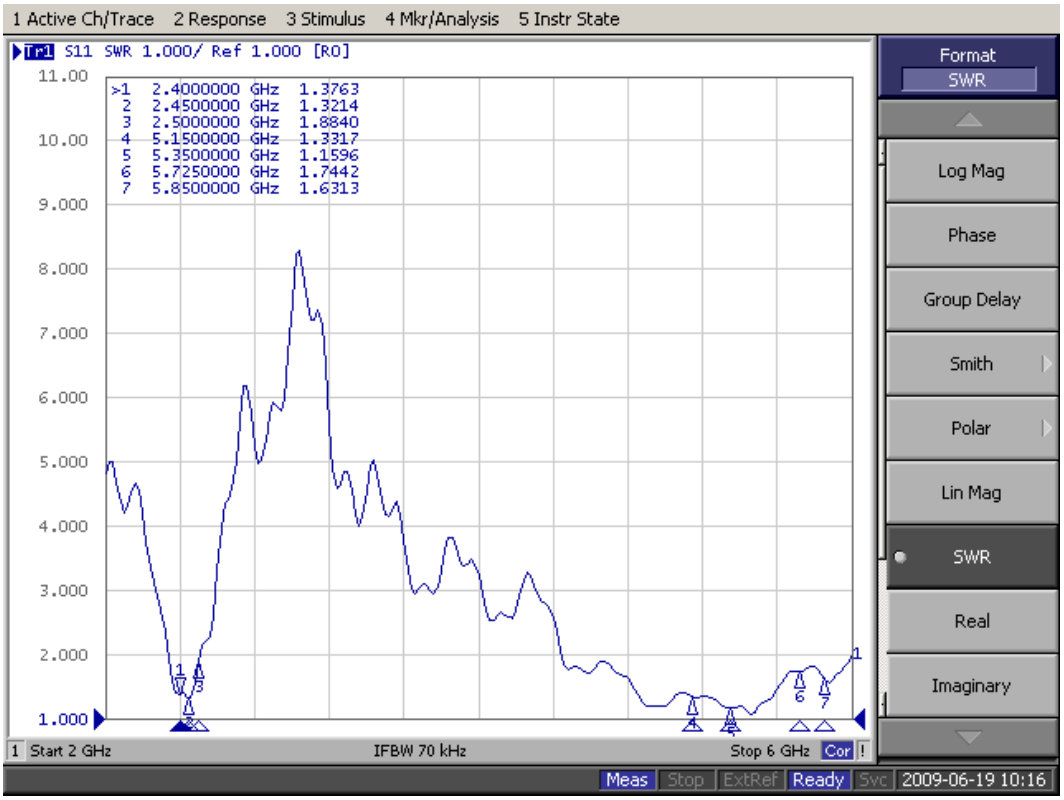
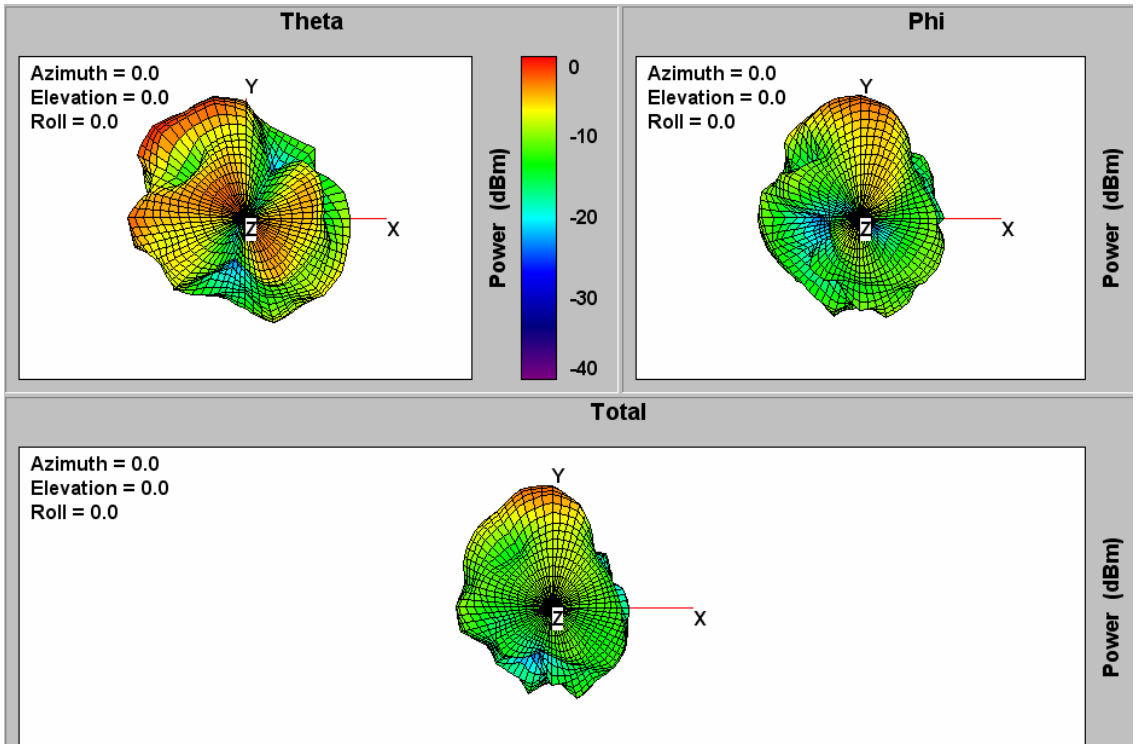
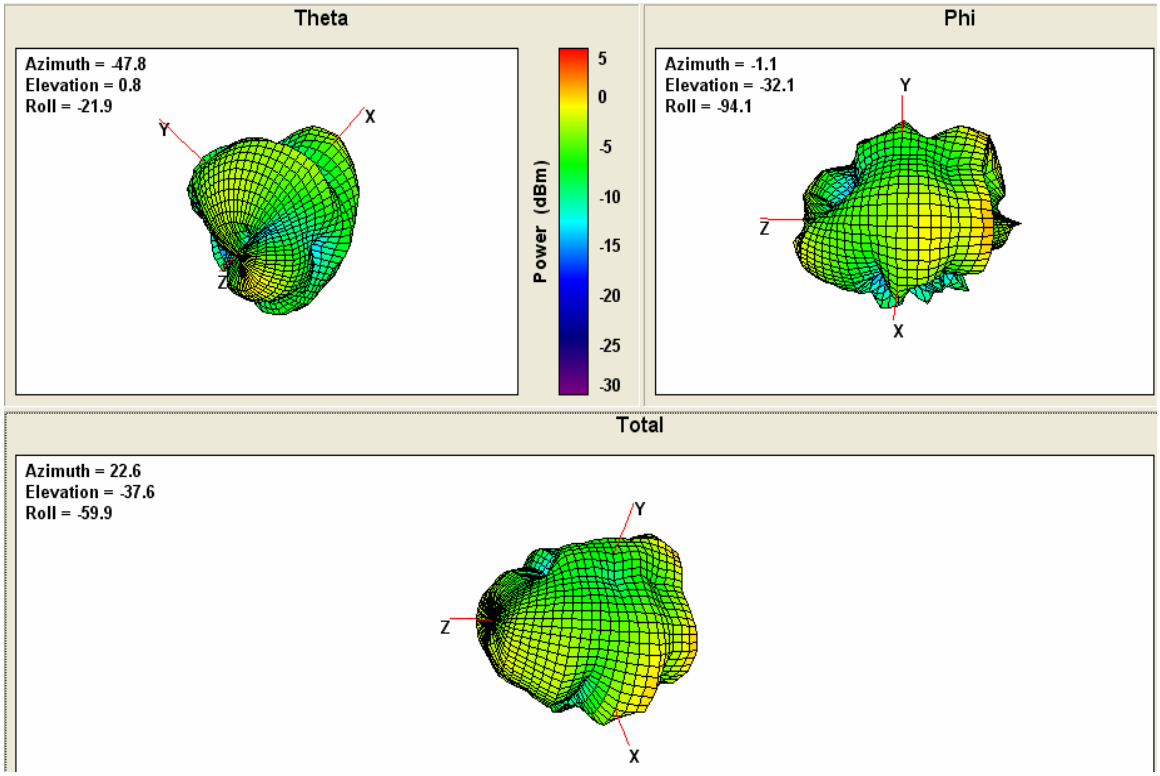


Antenna 1 Pattern



Antenna 2 Pattern



Test Summary

Antenna 1

Model	WANSHIN_DIPOLE_ANT_3D_FS_2400-5850 MHz								
Test / Position	Gain / Free Space								
Frequency	2400	2450	2500	4950	5150	5250	5350	5725	5850
Ant. Port Input Pwr. (dBm)	0	0	0	0	0	0	0	0	0
Tot. Rad. Pwr. (dBm)	0	0	0	0	0	0	0	0	0
Peak EIRP (dBm)	3.1632	4.36112	5.34066	4.4651	5.24286	5.31324	4.9749	3.92627	4.06678
Directivity (dBi)	7.14573	7.09798	7.03793	6.35548	7.05054	6.94101	6.55653	5.66147	5.92974
Efficiency (dB)	-3.98254	-2.73686	-1.69727	-1.89038	-1.80768	-1.62778	-1.58163	-1.7352	-1.86296
Efficiency (%)	39.9711	53.2493	67.6509	64.7085	65.9527	68.742	69.4764	67.0625	65.1184
Gain (dBi)	3.1632	4.36112	5.34066	4.4651	5.24286	5.31324	4.9749	3.92627	4.06678
NHPRP ±Pi/4 (dBm)	-5.55515	-4.32298	-3.38968	-4.40643	-4.29672	-4.1251	-4.04478	-4.13462	-4.19475
LHPRP / TRP Ratio (dB)	-3.5328	-3.80454	-4.01577	-4.69195	-4.83218	-4.83934	-4.80762	-4.87711	-4.72813
LHPRP / TRP Ratio (%)	44.3323	41.6434	39.6664	33.9472	32.8687	32.8145	33.0551	32.5304	33.6657
Front/Back Ratio (dB)	11.683	10.4828	13.859	2.96604	3.30389	2.83184	1.93979	3.18947	8.71662
Phi BW (°)	51	52	54	18	17	18	22	65	89
#NAME?	24	21	35	9	9	10	11	44	57
#NAME?	27	31	19	9	8	8	11	21	32
Theta BW (°)	52	61	57	54	40	37	38	101	64
#NAME?	29	37	27	16	15	15	17	52	36
#NAME?	23	24	30	38	25	22	21	49	28
Boresight Phi (°)	105	105	90	90	90	90	90	285	315
Boresight Th. (°)	75	75	75	150	150	150	150	15	15
Maximum Power (dBm)	3.1632	4.36112	5.34066	4.4651	5.24286	5.31324	4.9749	3.92627	4.06678
Minimum Power (dBm)	-21.1277	-16.1791	-21.1285	-17.9613	-18.2173	-20.8425	-21.4879	-26.0244	-19.417
Average Power (dBm)	-4.00758	-2.85354	-1.74072	-1.07929	-1.08213	-0.799589	-0.741692	-0.837944	-1.02597
Max/Min Ratio (dB)	24.2909	20.5402	26.4691	22.4264	23.4602	26.1558	26.4628	29.9507	23.4838
Max/Avg Ratio (dB)	7.17078	7.21466	7.08139	5.54438	6.32499	6.11283	5.71659	4.76421	5.09275
Min/Avg Ratio (dB)	-17.1202	-13.3255	-19.3878	-16.882	-17.1352	-20.0429	-20.7462	-25.1865	-18.391
Average Gain (dB)	-3.98254	-2.73686	-1.69727	-1.89038	-1.80768	-1.62778	-1.58163	-1.7352	-1.86296
Note									

Antenna 2

Model	WANSHIN_TEST_3D-1_FS_2400-5825 MHz							
Test / Position	Gain / Free Space							
Frequency	2400	2450	2500	4900	5150	5250	5750	5825
Ant. Port Input Pwr. (dBm)	0	0	0	0	0	0	0	0
Tot. Rad. Pwr. (dBm)	**-2.5362**	**-3.4669**	**-4.3993**	**-2.1682**	**-1.8984**	**-1.8421**	**-2.4334**	**-2.7068**
Peak EIRP (dBm)	**2.54811**	**0.95768**	**-0.0502**	**7.19245**	**7.74273**	**7.88411**	**6.2912**	**5.3316**
Directivity (dBi)	5.08429	4.4246	4.34907	9.36065	9.64115	9.72623	8.72462	8.03842
Efficiency (dB)	-2.53618	-3.46692	-4.3993	-2.1682	-1.89842	-1.84211	-2.43342	-2.70682
Efficiency (%)	55.7676	45.0099	36.3136	60.6988	64.5889	65.4318	57.1029	53.6189
Gain (dBi)	2.54811	0.957681	-0.050235	7.19245	7.74273	7.88411	6.2912	5.3316
NHPRP ±Pi/4 (dBm)	-4.48363	-5.38277	-6.15315	-4.15072	-3.93331	-3.852	-4.55516	-4.67412
LHPRP / TRP Ratio (dB)	-2.56314	-2.6033	-2.79237	-1.66116	-1.66873	-1.72815	-2.34673	-2.49538
LHPRP / TRP Ratio (%)	55.4225	54.9123	52.573	68.2157	68.0968	67.1714	58.2542	56.294
Front/Back Ratio (dB)	5.14592	5.03607	3.01379	17.221	11.6439	14.1259	8.28327	10.2933
Phi BW (°)	76	61	97	25	24	22	19	19
#NAME?	30	37	24	14	15	15	6	7
#NAME?	46	24	73	11	9	7	13	12
Theta BW (°)	75	54	49	30	27	27	29	33
#NAME?	63	40	28	11	13	13	17	18
#NAME?	12	14	21	19	14	14	12	15
Boresight Phi (°)	150	15	165	135	135	135	150	150
Boresight Th. (°)	135	105	150	150	150	150	150	150
Maximum Power (dBm)	2.54811	0.957681	-0.050235	7.19245	7.74273	7.88411	6.2912	5.3316
Minimum Power (dBm)	-19.4304	-15.1302	-16.2459	-15.8928	-16.837	-14.9589	-16.3686	-15.0286
Average Power (dBm)	-1.6807	-2.91187	-4.1792	-1.84364	-1.76628	-1.57182	-2.42397	-2.89759
Max/Min Ratio (dB)	21.9785	16.0879	16.1957	23.0852	24.5797	22.843	22.6598	20.3602
Max/Avg Ratio (dB)	4.22881	3.86955	4.12897	9.0361	9.50901	9.45593	8.71517	8.22919
Min/Avg Ratio (dB)	-17.7497	-12.2183	-12.0667	-14.0491	-15.0707	-13.3871	-13.9447	-12.131
Average Gain (dB)	-2.53618	-3.46692	-4.3993	-2.1682	-1.89842	-1.84211	-2.43342	-2.70682
Note								

3D Peak Gain & Efficiency

	ANT1	
	Peak Gain(dBi)	**Efficiency%**
2.4GHz	**3.16**	**40**
2.45GHz	**4.36**	**53**
2.5GHz	**5.34**	**68**
4.95GHz	**4.46**	**65**
5.15GHz	**5.24**	**66**
5.25GHz	**5.31**	**69**
5.35GHz	**4.97**	**69**
5.725GHz	**3.92**	**67**
5.85GHz	**4.06**	**65**

	ANT2	
	Peak Gain(dBi)	**Efficiency%**
2.4GHz	**2.55**	**56**
2.45GHz	**1.00**	**45**
2.5GHz	**-0.05**	**36**
4.9GHz	**7.20**	**61**
5.15GHz	**7.74**	**65**
5.25GHz	**7.88**	**65**
5.725GHz	**6.29**	**57**
5.85GHz	**5.33**	**53**

SPECIFICATION FOR APPROVAL

DOCUMENT: A3132SP001

STYLE： 200℃ 30V

SIZE: 32AWG×1C
SP 7/0.080 1.13㎜

RECOGNIZED:

WONDERFUL HI-TECH CO.,LTD.

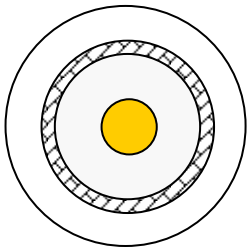
OFFICE：72WU KONG 6TH ROAD,
WU KU IND. DISTRICT
TAIPEI HSIEN,TAIWAN

TEL：(02)22988033
FAX：(02)22988031-2

FACTORY：17 PEI YUAN ROAD,
CHUNG-LI IND. PARK
TAIWAN, R.O.C.

TEL：(03)4527777
FAX：(03)4517214

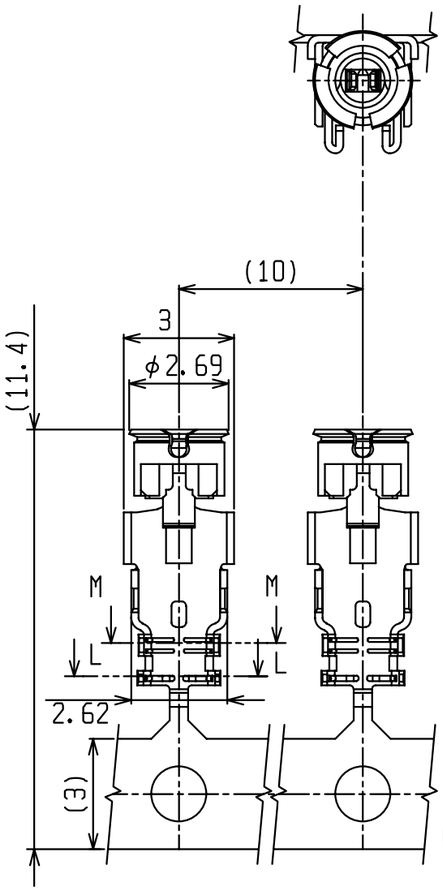
WONDERFUL HI-TECH CO., LTD.
SPECIFICATION

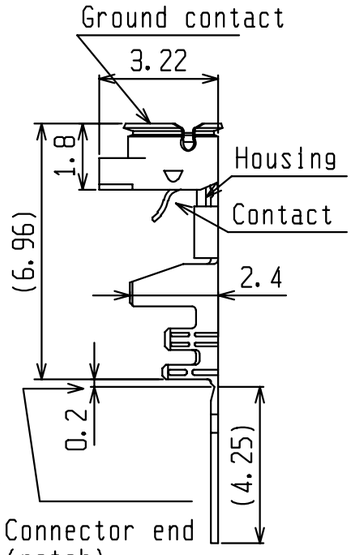
STYLE	200℃ 30V COAXIAL	DOCUMENT NO : A3132SP001	
SIZE	32AWG	ESTABLISHED DATE: 2003/01/16	
STANDARD :			
Conductor	Size	AWG	32
	Material	----	Silver-Coated Copper
	Conductors No.	----	7
	Conductors Size	mm	0.080
	O.D.	mm	0.240
Insulation	Average Thickness	mm	0.22
	Diameter	mm	0.68 ± 0.02
	Material	----	FEP
	Color	----	Clear
Braid	Material	----	Silver-Coated Copper
	Construction	mm	16 / 4 / 0.050
	Coverage	%	90
Jacket	Average Thickness	mm	0.13
	Diameter	mm	1.13 ±0.05
	Material	----	FEP
	Color	----	According to custom
Marking	NON		
Drawing			

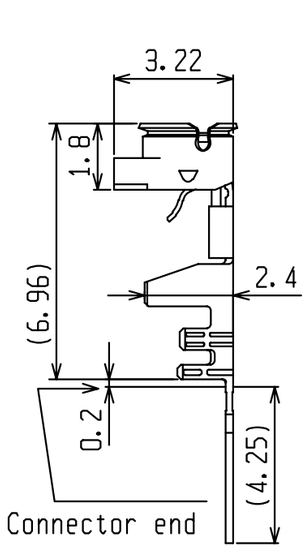
WONDERFUL HI-TECH CO., LTD.
SPECIFICATION

Electrical & Physical Properties							
Item			32AWG				
Rating Temp Voltage			200°C 30V				
Conductor Resistance			545 OHM/KM/20°C MAX.				
Insulation Resistance			100 MEGA OHM/KM MIN.				
Dielectric Strength			AC 1.0 KV/Minute				
Spark Test			0.5 KV				
Insulation	Unaged	Tensile Strength	2500 PSI MIN.(1.76 Kg / mm^2)				
		Elongation	200% MIN.				
	Aged	Tensile Strength	UNAGED MIN. 75%(168HRS×232°C)				
		Elongation	UNAGED MIN. 75%(168HRS×232°C)				
Jacket	Unaged	Tensile Strength	2500 PSI MIN.(1.76 Kg / mm^2)				
		Elongation	200% MIN.				
	Aged	Tensile Strength	UNAGED MIN.75%(168HRS×232°C)				
		Elongation	UNAGED MIN.75%(168HRS×232°C)				
Nom. Impedance			50 ± 3 Ohms				
Nom. Capacitance			96 ± 3 pF/m				
Nom. Vel. of Prop.			69%				
VSWR Test (0 – 6 GHZ)			Less 1.3				
Flame Test			VW-1 OK				
Attenuation (dB/1m)	100MHZ		400MHZ	1.8GHZ	2.4GHZ	5.2GHZ	
	0.60		1.25	2.23	2.70	4.15	

PART NO.
20278-**1R-**

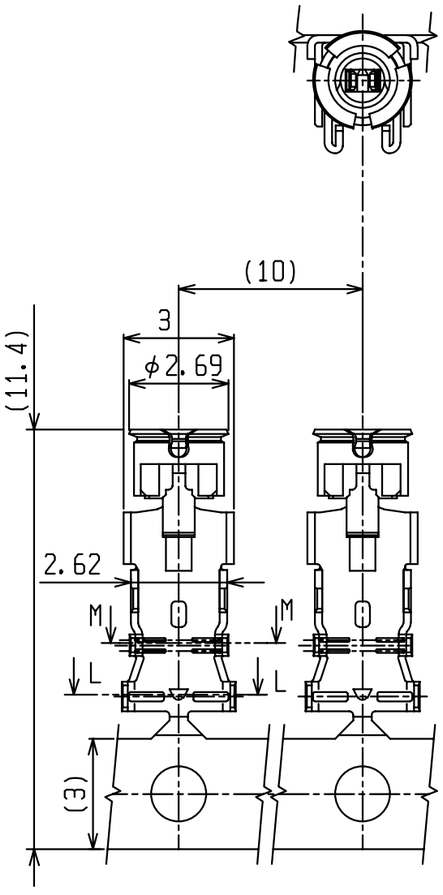


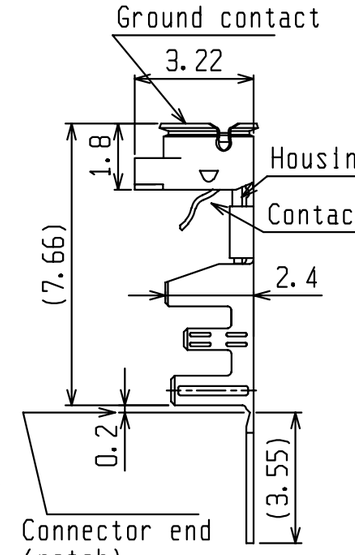


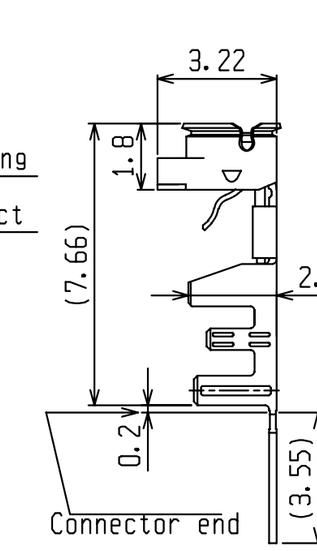


Part No. 20278-101R-08
20278-101R-13
20278-101R-32
For hand tool
(with notch)

Part No. 20278-111R-08
20278-111R-13
20278-111R-32
For semi auto
termination machine
(without notch)







Part No. 20278-101R-18
For hand tool
(with notch)

Part No. 20278-111R-18
For semi auto
termination machine
(without notch)

GENERAL TOLERANCE	
6 MAX.	±0.2
6 OVER MAX. 30	±0.3
30 OVER MAX. 120	±0.5
ANGLE	±2°

REV	ECN	BY	DATE	APP
15C	Z04398	K.O	Nov/12/'04	T.H
14C	Z04339	K.O	Oct/01/'04	T.H
13C	Z3074	A.H	May/22/'03	K.K
12C	Z3052	K.O	Apr/16/'03	K.K

REV	ECN	BY	DATE	APP
11C	Z3041	K.O	Mar/24/03	K.K
10C	Z3014	K.O	JAN/31/03	K.K
9C	Z2239	K.O	NOV/15/02	E.K
8C	Z2224	K.O	OCT/17/02	E.K
7B	Z2180	K.O	JUL/29/02	E.K
6B	Z2146	K.O	JUN/24/02	K.K
5B	Z2117	A.H	MAY/17/02	K.K

REV	ECN	BY	DATE	APP
4	Z2023	K.O	JAN/30/02	E.K
3	Z1256	K.O	NOV/14/01	K.K
2	Z1197	K.O	AUG/27/01	K.K
1	Z1118	K.O	JUN/26/01	K.K
0	Z1109	K.O	JUN/13/01	

REV. RECORD
SERIES No. 2814

DESIGN'D BY	DATE
K.Ohbayashi	JUN/13/01
CHK'D BY	DATE
APP'D BY	DATE
K.Katabuchi	JUN/13/01

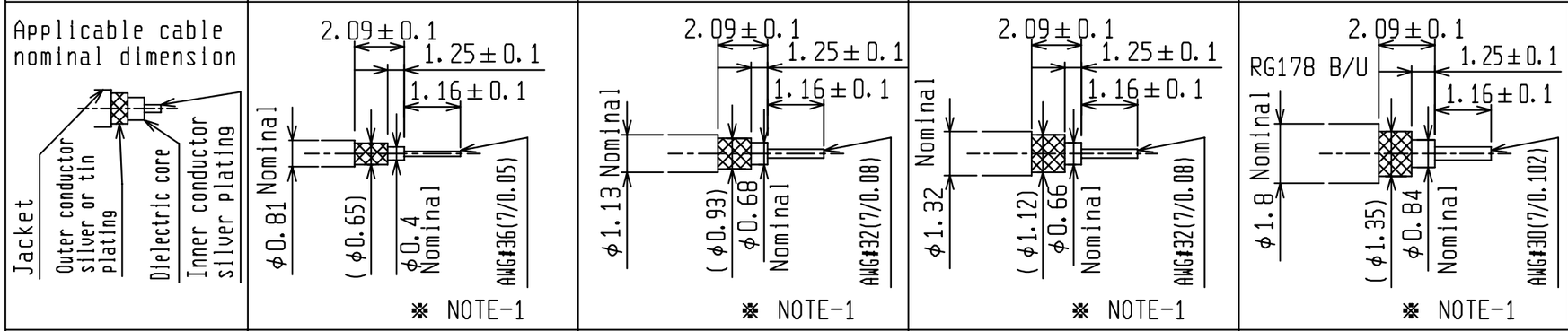
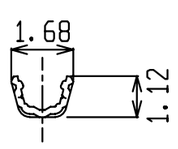
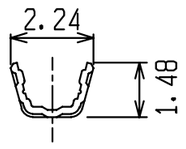
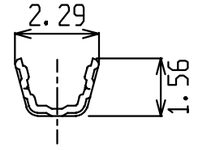
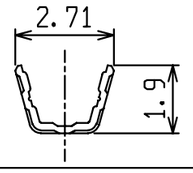
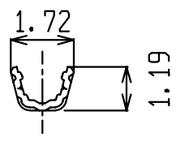
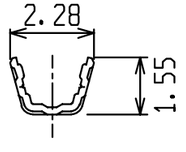
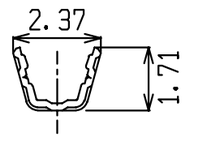
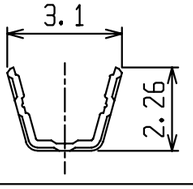
I-PEX Interconnect and Packaging Electronics TOKYO, JAPAN

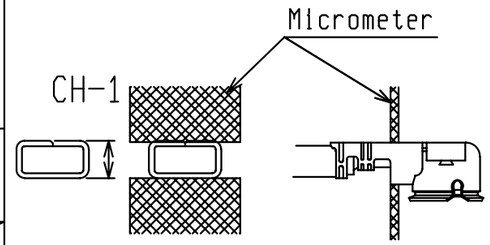
TITLE
MHF series micro coaxial connector plug
vertical (ground contact : gold plating)

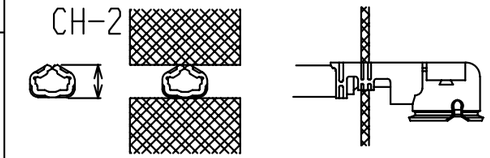
CUSTOMER COPY	PROJECTION	SCALE	UNIT	DWG. No.	SHEET	REV.
		6/1	mm	20278	1/3	15C

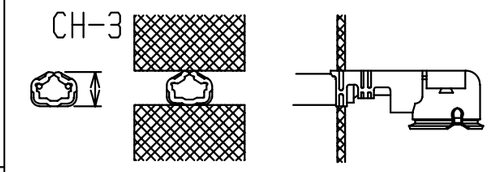
FORM REV. 4

WAS T

Part No.	20278-101R-08 / 20278-111R-08	20278-101R-13 / 20278-111R-13	20278-101R-32 / 20278-111R-32	20278-101R-18 / 20278-111R-18
Housing color	White	Black	Black	White
Applicable cable nominal dimension				
Braided shield of Outer conductor 外部導体の編組	Single / 1重編組	Single / 1重編組	Double / 2重編組	Single / 1重編組
P/N of hand Tool / P/N of semi auto termination machine	90187-008C / 90213-008C	90187-013C / 90213-013C	90187-032C / 90213-032C	90233-018 / 90232-018
Sect. M-M				
Sect. L-L				
Crimp Height CH-1	1.34～1.40	1.34～1.40	1.34～1.40	1.34～1.40
Crimp Height CH-2	0.76～0.84	1.06～1.14	1.20～1.30	1.41～1.49
Crimp Height CH-3	0.85～0.97	1.15～1.35	1.26～1.46	1.70～1.80







Crimp Height

NOTE-1
中心導体，外部導体への半田ｺｰﾃｨﾝｸﾞは不可
Must not use solder coated
inner conductor and outer conductor.

GENERAL TOLERANCE	
6 MAX.	±0.2
6 OVER MAX. 30	±0.3
30 OVER MAX. 120	±0.5
ANGLE	±2°

REV	ECN	BY	DATE	APP

REV. RECORD
SERIES No. 2814

DESIGN'D BY DATE
CHK'D BY DATE
APP'D BY DATE

CUSTOMER COPY
PROJECTION

I-PEX Interconnect and Packaging Electronics TOKYO, JAPAN

TITLE: MHF series micro coaxial connector plug vertical (ground contact : gold plating)

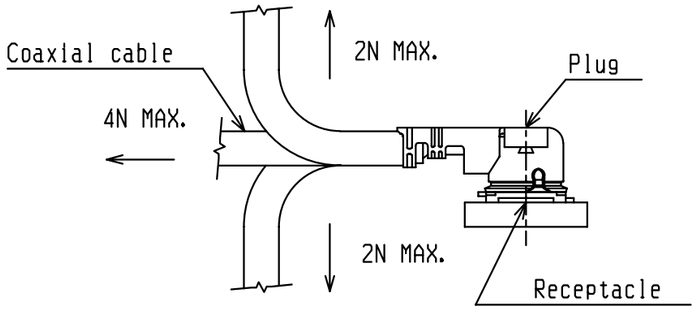
SCALE	UNIT	DWG. No.	SHEET	REV.
-/-	mm	20278	2/3	15C

FORM REV. 4

WAS T

Notes

1. Material
 (1) Housing : PBT , UL94V-0
 (2) Contact
  phosphor bronze
  gold plating 0.1μm MIN.
  over nickel 1.27μm MIN.
 (3) Ground contact
  phosphor bronze
  gold plating 0.05μm MIN.
  over nickel 1.27μm MIN.
2. Packing : reel
3. Mating partner part No.
  : 20279-001E-01
4. Permissible load of cable at mating



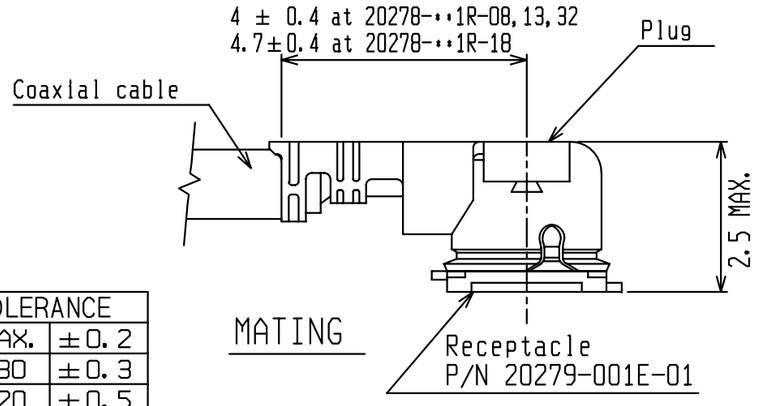
1. 材 料
(1) ハウジング：PBT，UL94V-0
(2) コンタクト
りん青銅
金メッキ0.1μm MIN.
下地 ニッケル1.27μm MIN.
(3) グランドコンタクト
りん青銅
金メッキ0.05μm MIN.
下地 ニッケル1.27μm MIN.
2. 梱包 : リール
3. かん合相手 part No.
:20279-001E-01
4. コネクタかん合後のケーブルに対する荷重

5. Suggestions for mating & unmating operation.

5-1 Mating.
Please mate the connector straightly to vertical direction as much as possible, adjusting the mating axis of plug and receptacle.
As excessive slant angle mating may break the connector , please don't do it.

5. コネクタかん合時および抜去時の注意

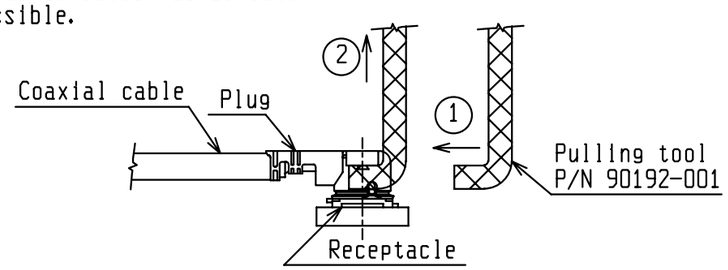
5-1 コネクタ挿入時
PlugとReceptacleのかん合軸を合わせ、できるだけ垂直に挿入して下さい。
極端な斜め挿入は行わないで下さい。
コネクタ破損の原因となりますので、過度なこじり挿抜は行わないで下さい。



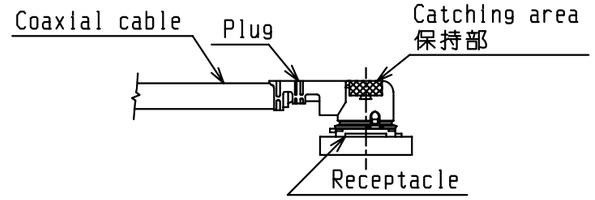
GENERAL TOLERANCE	
6 MAX.	±0.2
6 OVER MAX. 30	±0.3
30 OVER MAX. 120	±0.5
ANGLE	±2°

5-2 Unmating.

(1) In case of unmating by pulling tool.
Please use the pulling tool as the following drawing, and please pull plug to vertical direction as directly as possible.



(2) In case of unmating directly by hand
Please catch the catching area of plug , and please pull plug to vertical direction as directly as possible.



5-3 Crimp over standards of outer conductor

Standards:Less than 10% from total numbers of outer conductor
(Numbers of outer conductor's crimp over from outer conductor's barrel)

5-4 Caution about Heat shrinkage tubes

Please be cureful not to melt housing when using heat shrinkage tubes.
It will become cause of open circuit.

6. This is "Pb-free" connector.

5-2 コネクタ抜去時

(1) 抜去ジグを用いる場合
下図のようにできるだけ垂直に引き抜いて下さい。

(2) 手で直接引き抜く場合
下図の保持部をつかみ，できるだけ垂直に引き抜いて下さい。

5-3 外部導体はみ出し量

外部導体はみ出し量規定
：外部導体トータル本数の10%以下
（外部導体パレルの外にはみ出した量）

5-4 熱収縮チューブについての注意
熱収縮チューブで外部導体を覆う場合は、導通不良の原因になりますので、熱によりハウジグを溶融させないよう注意してください。

6. 本コネクタは"Pb-free"である

REV	ECN	BY	DATE	APP

REV. RECORD
SERIES No. 2814

DESIGN'D BY DATE
CHK'D BY DATE
APP'D BY DATE

CUSTOMER COPY
PROJECTION

I-PEX Interconnect and Packaging Electronics TOKYO. JAPAN

TITLE
MHF series micro coaxial connector plug vertical (ground contact : gold plating)

SCALE	UNIT	DWG. No.	SHEET	REV.
—/—	mm	20278	3/3	15C

FORM REV. 4

WAS T

零件成分表及第三公正單位測試報告
Composition table and 3'rd party test report

組成成份 Composition							模組類(04/0A/0C/0K/17/19/18/0B) Module type(04/0A/0C/0K/17/19/18/0B)	
使用部位 The position for use	原材料名 Raw materials	原材料料號 Material No.	原物料生產廠家 Vendor of Raw material	第三公正單位測試報告 3'rd party test report	原材料顏色 (塑膠、油墨及漆料必填) The color of raw material (Required for plastic, ink and paint)	鍍層存在與否/鍍層材質說明 If the plating layer exist or not?(Y/N)/If yes, please describe the material of the plating layer	是否爲組裝到系統後之外露部位 If the module will be exposed outside after system assembly?(Y/N)	Notes
wire	copper	mini 1.13	萬泰	H:\天線\天線材質SGS\電線		Y, 鍍錫	N	
	plastic				浅灰	N	N	
	tin					N	N	
	plastic				透明	N	N	
MHF	CONTACT	20278	I-PEX	H:\天線\天線材質SGS\金屬	金	Y, 鍍金	N	
	MHF PULG HOUSING				黑	N	N	
	MHF PULG CONTACT				金	Y, 鍍金	N	
PCB	华金成品板	WPB127	三生	H:\天線\SGS材質報告\材料	银	Y, 鍍锡	N	
	tin			C:\Documents and Settings\ala	银	Y, 鍍锡	N	
	ink			C:\Documents and Settings\ala		N	N	
	COPPER			H:\天線\SGS材質報告\材料	金	N	N	
	osp			C:\Documents and Settings\ala		N	N	
	绿漆			C:\Documents and Settings\ala	绿	N	N	
	板材			D:\My Documents\生益板材SGS C级\	黄	N	N	
背胶	压缩泡棉	EVA G9000胶	云裳	C:\Documents and Settings\ala	黑	N	N	
				C:\Documents and Settings\ala	透明	N	N	

Certificate of the Non-Use Hazardous Substances

Please fill in below information 請填寫以下資訊：

Date 日期：2009 / 06 / 17

Vendor code 供應商代號：MC160TW1

Company name 公司名稱：蘇州萬旭電子元件有限公司

(Authorized-person Sign or Seal)

(Company Stamp/公司官)

Company Representative 公司代表人：楊孟均

Company Representative Title 公司代表人職稱：經理

Please Mark ■ Warranty Application 請於適用保證範圍標示■：

■ All "Products" we sold to Pegatron/Unihan 所有我方售予和聯/永碩之"產品"

☐ Pegatron/Unihan Part number 和聯/永碩料號：_____

Vender PN 供應商料號：_____

Pegatron/Unihan Model name 和聯/永碩機種名稱：_____ (OEM/ODM/EMS vendor fill out ONLY 外包商填寫專用)

To Pegatron Corp., Unihan Corp., and their affiliates (collectively "Pegatron/Unihan Group")：

We hereby represent and warrant that the products and components ("Products") we sold to Pegatron/Unihan Group do not contain the level 1 hazardous substances listed in the then current Pegatron/Unihan SPT-00001 document and those indicated in the tables shown below (Table A~C), as well as shall comply with all requirements listed in the then current Pegatron/Unihan GP2-00017 document, including but not limited to design, modification, purchasing, and manufacturing management, as well as the confirming and judging of the test, which the Pegatron/Unihan Group reserves the right to modify these documents at any time. The aforementioned Products include：[1] Products and all materials of the Products; [2] packaging materials; and [3] all materials used in design, manufacturing and reworking processes. In addition, the information of hazardous substances classified at level 3 should be disclosed when these substances are intentionally used in the said Products. This certificate is applied to requirement(s) as below:

此致和碩聯合科技(股)公司/永碩聯合國際(股)公司及其關係企業("和聯/永碩集團")：

我們特此代表並保證所有售予和聯/永碩集團之產品及零組件("產品")，皆不含有當時和聯/永碩 SPT-00001 文件中所列的一級有害物質*以及以下表格內所述之禁用物質(表 A~C)，並且遵守當時和聯/永碩 GP2-00017 文件中所列之各項要求，包括但不限於設計、變更、採購、生產管理及確認測定及判定，上述文件和聯/永碩集團保留隨時修改的權利。前述所提及的產品包含：[1]產品或產品所使用到的所有原物料；[2]包裝材料；[3]設計、生產及重工過程中所使用到的所有原物料；此外，若前述提及之產品中刻意添加三級有害物質，則須揭露資訊。

Customer I.D 客戶別：10

■ General HSF requirement. (Table A and B) 一般 HSF 要求(Table A and B)

☐ HF requirement (Table C) HF 要求 (Table C)

■ Environmental labeling requirement, please fill in 環保標章要求，請填寫：EPEAT (Table D)

☐ Other 其他：N.A.

We further agree to indemnify and hold Pegatron/Unihan Group and their officers, directors, employees, successors and assigns, harmless from and against any losses, damages, claims, demands, suits, liabilities and expenses (including reasonable attorneys' fees and court costs) arising out of or resulting from any lawsuit, judicial action, or similar proceeding for any breach of the foregoing warranty

我們進一步同意賠償和使和聯/永碩集團及其集團人員，包括高級主管、董事、員工、代理人、繼承者和受讓人，不受任何起因於我方違反前項保證所致之任何訴訟、司法上行為或類似行為而受有損失、損害、求償、請求、訴訟、責任及費用(包括合理的律師費用和法院費用)。

***** If the Product contains the hazardous substances defined as the exemptions in SPT-00001, please check the appropriate box in the Appendix. (OEM/ODM/EMS vendor fill out ONLY)**.**

*若您是外包商且產品所含有害物質屬於 SPT-00001 所定義之除外項目，請勾選附件之選項(零件供應商免填)。

Remarks 備註：

Table A. General Product Content Restrictions

Substance/item	Threshold weight % (ppm)	Section containing details and exemptions
Asbestos	Not present	3.1
Batteries – Mercury	1. Batteries(excluding button cell): 5 ppm 2. Button cell batteries: 20000 ppm 3. Alkaline-manganese button cell batteries: 25 mg/per battery or 20000 ppm 4. Alkaline zinc and manganese batteries (except button cells): 1 ppm 5. Products, parts and components must not contain mercuric oxide batteries	3.2.1
Batteries - Cadmium	10 ppm	3.2.2
Batteries – Lead (nonrechargeable)	2000 ppm	3.2.3
Batteries – Non rechargeable Alkaline and Carbon-Zinc Batteries	No threshold - hermetically seal	3.2.4
Batteries - Classification as “Not Restricted” for Transport	Various (see section)	3.2.5
Brominated Flame Retardants (PBBs, PBDEs, including DecaBDE)	1000 ppm	3.3.1
Brominated Flame Retardants (all BFRs in external case plastic parts)	1000 ppm	3.3.2
Brominated Flame Retardants	900 ppm	3.3.3
Cadmium and its compounds	100 ppm	3.4
Certain Azo Colorants	30 ppm	3.5
Chlorinated Hydrocarbons	1000 ppm	3.6
Chlorinated Paraffins	1000 ppm	3.7
Formaldehyde	1.Wooden materials: 0.05 ppm 2.Textile materials: 75 ppm	3.8.1 3.8.2
Hexavalent-Chromium (Cr^{6+}) Compounds	1. In metallic applications: not present 2. In non-metallic applications: 1000 ppm	3.9.1 3.9.2
Lead and its compounds	1. Lead and its compounds: 1000 ppm 2. Lead carbonates and sulfates in paint: 100 ppm 3. Lead in Polyvinyl Chloride (PVC) coating of external cables, wires and cords: 300 ppm	3.10.1 3.10.2 3.10.3
Mercury and its compounds	1000 ppm	3.11
Nickel on external surfaces	Nickel on external surfaces 0.5ug/cm2/week	3.12
Ozone Depleting Substances (ODS)	Not used or present	3.14

Polycyclic Aromatic Hydrocarbons (PAH)	Various (see section)	3.15
Perfluorooctane sulfonates (PFOS) in parts	1000 ppm	3.16.1
Perfluorooctane sulfonates (PFOS) in preparations	50 ppm	3.16.2
Polychlorinated Biphenyls (PCBs) and Polychlorinated Terphenyls (PCTs)	50 ppm	3.17
Polychlorinated Naphthalenes	5 ppm	3.18
1. Polyvinyl Chloride (PVC) in external case plastic parts 2. Polyvinyl Chloride (PVC)	1. Not used 2. 900 ppm	3.19.1 3.19.2
Radioactive Substances	Not present	3.20
Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)	5 ppm	3.21

Noted:

1 Asbestos: Asbestos must not be present in parts, components, materials or products.

2 Battery Requirements

The battery requirements below do not apply at the homogeneous material level, and apply at the weight of the battery.

3.2.1 Mercury in Batteries

3.2.1.1 Batteries must not contain mercury exceeding 0.0005% (5 ppm) by weight. Button cell batteries and batteries composed of button cell batteries, with a mercury content of no more than 2% (20,000 ppm) by weight, are not subject to this requirement.

3.2.1.2 Alkaline zinc and manganese batteries (except button cells) must not contain more than 0.0001% (1 ppm) mercury by weight. The total mercury content of alkaline-manganese button cell batteries must not exceed 25 milligrams of mercury per button cell or 2% (20,000 ppm) by weight, whichever is less.

3.2.1.3 HP products, parts, and components must not contain mercuric oxide batteries.

3.2.2 Cadmium in Batteries: The total cadmium content of batteries must not exceed 0.001% (10 ppm) by weight.

3.2.3 Lead in Batteries: Nonrechargeable type batteries must not contain lead exceeding 0.2% (2000 ppm) by weight.

3.2.4 Nonrechargeable Alkaline and Carbon-Zinc Batteries: Nonrechargeable alkaline and carbon-zinc batteries must be hermetically sealed.

3.2.5 Battery Classification as "Not Restricted" for Transport

All batteries must meet all applicable design, manufacture, marking, testing, and other battery-specific requirements necessary to be classified as "Not Restricted" for purposes of transport for all modes of transportation, as defined in the following documents:

. United States, "Hazardous Materials Regulations," Title 49, Code of Federal Regulations, US Department of Transportation (DOT)

. International Civil Aviation Organization (ICAO), "Technical Instructions for the Safe Transport of Dangerous Goods by Air"

. International Air Transport Association (IATA), "Dangerous Goods Regulations"

Documentation, such as a Material Safety Data Sheet [MSDS] or Product Data Sheet [PDS] that demonstrates compliance to these regulations must be supplied to HP upon request.

3.2.5.1 Lead-Acid Batteries. Rechargeable sealed lead-acid batteries must meet dangerous goods transport criteria for nonspillable batteries as specified in ICAO/IATA Packaging Instruction 806 and Special Provision A67, and must be tested at 55°C (130°F) to ensure no free liquid flows from the case when it is cracked or ruptured. The batteries also must not contain any free or unabsorbed liquid. In addition to the labeling requirements in section 4 of this document, the words "NONSPILLABLE" or "NONSPILLABLE BATTERY" must be marked on the battery and the outside packaging.

3.2.5.2 Lithium Metal and Lithium Ion Cells, Batteries, and Battery Packs. Each lithium metal or lithium ion cell, battery, or battery pack (including lithium metal, lithium alloy, lithium ion, lithium polymer, and equivalent lithium content cells, batteries, or battery packs) must meet the product content, testing, and related requirements specified in the HP specification *HP Requirements for Lithium Metal and Lithium Ion Cells, Batteries, and Battery Packs* [pdf].

3 Brominated Flame Retardants

3.3.1 Parts, components, materials, and products must not contain flame retardants that are polybrominated biphenyls (PBBs) or polybrominated diphenyl ethers (PBDEs), including Decabromobiphenyl Ether (DecaBDE), also known as polybrominated biphenyl ethers (PBBEs) and polybrominated biphenyl oxides (PBBOs), in concentrations greater than or equal to 0.1% (1000 ppm) by weight in any homogeneous material. PBBs and PBDEs restricted under this section include, but are not limited to, those listed in Table 2.

3.3.2 External case plastic parts of products (parts visible to the customer in normal product operation) must not contain Tetrabromobisphenol–A (TBBP-A, CAS# 79-94-7), or any other brominated flame retardants, in concentrations greater than or equal to 0.1% (1000 ppm) by homogenous material weight. This requirement does not apply to printed circuit board base materials or printed circuit assemblies.

3.3.3 When specified in HP product and component specifications, organobromine compounds in the form of flame retardants must not be used in parts, components, materials, or products in concentrations equal to or greater than 0.09% (900 ppm) by weight in any homogeneous material.

3.4 Cadmium

Cadmium and its compounds must not be used in parts, components, materials, or products in concentrations greater than 0.01% (100 ppm) by weight in any homogeneous material. This requirement includes cadmium and its compounds in pigments, dyes, stabilizers, plating, and paints, but does not apply to cadmium in the following applications:

3.4.1 Cadmium in optical and filter glass

3.4.2 Cadmium and its compounds in the plating on the mating surfaces of electrical contacts in connectors

More restrictive limits apply when this substance is used in packaging and batteries. Refer to the HP Packaging Requirements and section 3.2 of this standard.

3.5 Certain Azo Colorants

Azo colorants must not be used in HP products made from textiles or leather (such as carrying cases and protective covers) in concentrations greater than or equal to 0.003% (30 ppm) by weight in any homogeneous material, where the substance may come in prolonged direct contact with exposed skin. Restricted substances released by azo colorants are listed in Table 1.

3.6 Chlorinated Hydrocarbons

The chlorinated hydrocarbons listed in Table 3 must not be contained in any parts, components, materials or products in concentrations greater than or equal to 0.1% (1000 ppm) by weight in any homogeneous material.

3.7 Chlorinated Paraffins

Short Chain Chlorinated Paraffins (SCCPs) including, but not limited to, those identified by CAS numbers 63449-39-8 and 85535-84-8, must not be used or contained in softeners in paints, coatings and sealants; in oils; or in flame-retardants in rubber, plastic and textiles, in concentrations greater than or equal to 0.1% (1000 ppm) by weight in any homogeneous material.

3.8 Formaldehyde

3.8.1 Formaldehyde must not be used in textile materials intended for skin contact greater than 0.0075% (75 ppm) by weight in any homogeneous textile material.

3.8.2 Formaldehyde must not exceed the emissions requirements as defined in Tables 1 and 2 in the *Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products*, sections 93120-93120.12, title 17, California Code of Regulations. This requirement applies to wooden materials, pallets, wood packaging made of plywood, pressed wood, and fiber board after 31 December 2008.

3.9 Hexavalent Chromium

3.9.1 Metallic applications: Hexavalent chromium and its compounds must not be present in any concentration in metallic applications (such as corrosion preventative coatings and conversion coatings).

3.9.2 Non-metallic applications: Hexavalent chromium and its compounds must not be present in concentrations greater than 0.1% (1000 ppm) by weight in any homogeneous material in non-metallic applications (such as paints, pigments, and plastics).

HP-approved test methods are listed in Table 8.

More restrictive limits apply when this substance is used in packaging. Refer to the HP Packaging Requirements.

3.10 Lead

3.10.1 Lead and its compounds must not be used in parts, components, materials, or products in concentrations greater than 0.1% (1000 ppm) by weight in any homogeneous material. This requirement does not apply to lead in the following applications:

3.10.1.1 Lead in glass of cathode ray tubes, electronic components and fluorescent tubes

3.10.1.2 Lead as an alloying element in steel containing up to 0.35% lead by weight

3.10.1.3 Lead as an alloying element in aluminum containing up to 0.4% lead by weight

3.10.1.4 Lead as an alloying element in copper containing up to 4% lead by weight

3.10.1.5 Lead in high melting temperature type solders (such as lead-based solder alloys containing 85% or more lead by weight)

3.10.1.6 Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signaling, transmission, and network management for telecommunications

3.10.1.7 Lead in electronic ceramic parts (for example, piezoelectronic devices)

3.10.1.8 Lead in lead-bronze bearing shells and bushes

3.10.1.9 Lead used in compliant pin connector systems

3.10.1.10 Lead as a coating material for the thermal conduction module c-ring

3.10.1.11 Lead in optical and filter glass

3.10.1.12 Lead in solders consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80% and less than 85% by weight

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

3.10.1.14 Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCDs)

3.10.1.15 Lead oxide in plasma display panels and surface conduction electron emitter displays used in structural elements, notably in the front and rear glass dielectric layer, the bus electrode, the black stripe, the address electrode, the barrier ribs, the seal frit and frit ring, and in print pastes.

3.10.1.16 Lead as impurity in RIG (rare earth iron garnet) Faraday rotators used for fiber optic communications systems.

3.10.2 **Lead in Paint.** Lead carbonates and sulfates must not be used in any paint applied to parts, components, materials, or products in concentrations greater than 0.01% (100 ppm) by weight in the paint.

3.10.3 **Lead in Polyvinyl Chloride (PVC) Coating for External Cables, Wires and Cords**. The concentration of lead (Pb) in the PVC coating (outer jacket) of external PVC coated cables, wires or cords must not exceed 0.03% (300 ppm) by weight in any homogeneous material. This requirement applies to the PVC coating (outer jacket) of external PVC coated cables, wires or cords, including connectors and plugs, in any of the following parts, components, and products:

- Computer mouse, roller ball, and joystick cords
- Computer peripheral wires and cables, AC adapter cords, interface cables and PCMCIA card cords for portable computers or portable peripheral devices
- Computer peripheral wires and cables designed to plug into portable devices, computers and the front of desktop computers (for example, USB cords)
- Computer speaker cords used with portable computers
- Computer power/patch/pin cords designed to plug into the front of desktop computers
- External CD/DVD and tape drives for portable computers
- Laptop and notebook computer cords
- USB, FireWire, telephone, modem, LAN and other cables, wires and cords designed for and used with portable products including, but not limited to:
  - Cell phones
  - GPS devices
  - Handheld PCs and Personal Digital Assistants (PDAs)
  - Portable digital imaging equipment (cameras and web cams)

. Portable CD and DVD players
. Portable scanners
. Portable projectors
. Portable printers
. Portable audio and video players
. Portable storage devices including hard disk drives, media drives, solid state storage devices, ZIP drives, and so forth; and related accessories
. Portable computer input devices including handheld mice, touch pads, keypads, and graphic input tablets

More restrictive limits apply when this substance is used in packaging.

3.11 Mercury

Mercury and its compounds must not be used in parts, components, materials, or products (including switches, relays or electrical contacts) in concentrations greater than 0.1% (1000 ppm) by weight in any homogeneous material. This requirement does not apply to mercury in the following applications:

3.11.1 Mercury in compact fluorescent lamps not exceeding 5 mg per lamp

3.11.2 Mercury in straight fluorescent lamps for general purposes not exceeding 10 mg in halophosphate lamps

3.11.3 Mercury in straight fluorescent lamps for general purposes not exceeding 5 mg in triphosphate lamps with normal lifetime

3.11.4 Mercury in straight fluorescent lamps for general purposes not exceeding 8 mg in triphosphate lamps with long lifetime

3.11.5 Mercury in straight fluorescent lamps for special purposes (such as scanner bulbs and backlit displays)

3.11.6 Mercury in other lamps not specifically mentioned in this list (such as projector lamps and digital projector TVs)

More restrictive limits apply when this substance is used in packaging and batteries. Refer to the section 3.2 of this standard.

3.12 Nickel

Nickel finishes that release greater than 0.5 µg/cm2/week must not be used on the external surface of any product designed to be frequently handled or carried by the user (or intended to be in direct and prolonged skin contact). Measurement to be performed using EN 1811:1998.

3.13 RoHS Compliance

All parts, components, and materials used in electrical and electronic products must comply with the European Union's Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment, as amended from time to time, ("RoHS" Directive) and similar regulations that may be adopted by other countries, States or regions. Refer to the following sections of this document for HP substance-specific requirements and supplier verification requirements:

Section 3.3.1 Brominated Flame Retardants

Section 3.4 Cadmium and its compounds

Section 3.9 Hexavalent chromium and its compounds

Section 3.10 Lead and its compounds

Section 3.11 Mercury and its compounds

Section 4 Supplier Verification

3.14 Ozone Depleting Substances (ODS)

ODSs listed in Table 4, Table 5 and Table 6 must not be present in any parts, components, materials, or products or used in the manufacturing process of any parts, components, materials or products. This requirement does not apply to use of these substances in refrigeration units used in manufacturing facilities or in data center facilities.

3.15 Polycyclic Aromatic Hydrocarbons (PAH)

When specified in HP product and component specifications, PAHs must not be used in the external surfaces of the products listed in the product categories 2 and 3 below in concentrations greater than the limits defined within each product category by weight in any homogeneous material. Measurements are to be performed using methods identified in ZEK 01-08.

Product category 1: Product category 1 does not apply to HP products.

Product category 2:

. External cases for portable devices (Notebook PCs, portable printers)
. Desktop keyboard and mouse
. Portable computer input devices including handheld mice, touch pads, keypads, and graphic input tablets

. External Power Supplies for portable devices
. Cables for portable devices (including power cords and interconnect cables, and so forth)

Product category 2 PAH limits:

. Benzo[a]pyren: 1 mg/kg
. Sum 16 PAH (EPA): 10 mg/kg

These limits apply to material with foreseeable contact to skin for longer than 30 seconds (long-term skin contact)

Product category 3:

. External cases for stationary devices (printers, PCs, and so forth)
. Desktop PCs
. Monitors
. External Power Supplies for stationary devices
. Power Cables for stationary devices

Product category 3 PAH limits:

. Benzo[a]pyren: 20 mg/kg
. Sum 16 PAH (EPA): 200 mg/kg

The limits apply to material with foreseeable contact to skin up to 30 seconds (short-term skin contact) or without skin contact.

3.16 Perfluorooctane sulfonates

3.16.1 Perfluorooctane sulfonates (PFOS, CAS# 1763-23-1) must not be used in concentrations equal to or greater than 0.1% (1000 ppm) by weight in parts, components, or products.

3.16.2 Perfluorooctane sulfonates (PFOS, CAS# 1763-23-1) must not be used in concentrations equal to or greater than 0.005% (50 ppm) by weight in preparations.

The requirements in sections 3.16.1 and 3.16.2 do not apply to the following applications or processes:

. Photoresists or antireflective coatings for photolithography processes
. Photographic coatings applied to films, papers, or printing plates
. Mist suppressants for nondecorative hard chromium (VI) plating
. Wetting agents for use in controlled electroplating systems

3.17 Polychlorinated Biphenyls (PCBs) and Polychlorinated Terphenyls (PCTs)

Polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs) must not be used in concentrations greater than 0.005% (50 ppm) by weight in preparations.

3.18 Polychlorinated Naphthalenes (more than 3 chlorine atoms)

Polychlorinated Naphthalenes (more than 3 chlorine atoms) must not be present in parts, components, materials, or products in concentrations greater than or equal to 0.0005% (5 ppm) by weight in any homogeneous material.

3.19 Polyvinyl Chloride (PVC)

3.19.1 PVC must not be used in the external case plastic parts of products (parts visible to the customer in normal product operation). This restriction does not apply to the sheathing of wires and cables, plastic parts weighing less than 25 grams, to protective product covers, or to display screens for projection.

3.19.2 When specified in HP product and component specifications, organ chlorine compounds in the form of polyvinyl chloride or polyvinyl chloride congeners must not be used in parts, components, materials, or products in concentrations equal to or greater than 0.09% (900 ppm) by weight in any homogeneous material.

3.20 Radioactive Substances

Radioactive substances must not be present in parts, components, materials or products listed in Table 8.

3.21 Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

TBTs, TPTs, and TBTOs listed in Table 7 must not be used in parts, components, materials or products in concentrations greater than or equal to 0.0005% (5 ppm) by weight in any homogeneous material

Table 1 - Azo Colorants

Note that the EC azo colorant restriction applies to certain azo colorants that by reductive cleavage of azo groups may release one of the following 22 aromatic amines

Name	CAS Numbers
biphenyl-4-ylamine	92-67-1
benzidine	92-87-5
4-chloro-o-toluidine	95-69-2
2-naphthylamine	91-59-8
o-aminoazotoluene	97-56-3
5-nitro-o-toluidine	99-55-8
4-chloroaniline	106-47-8
4-methoxy-m-phenylenediamine	615-05-4
4,4'-methylenedianiline	101-77-9
3,3'-dichlorobenzidine	91-94-1
3,3'-dimethoxybenzidine	119-90-4
3,3'-dimethylbenzidine	119-93-7
4,4'-methylenedi-o-toluidine	838-88-0
6-methoxy-m-toluidine	120-71-8
4,4'-methylene-bis(2-chloroaniline)	101-14-4
4,4'-oxydianiline	101-80-4
4,4'-thiodianiline	139-65-1
o-toluidine	95-53-4
4-methyl-m-phenylenediamine	95-80-7
2,4,5-trimethylaniline	137-17-7
o-anisidine	90-04-0
4-amino azobenzene	

Table 2 - PBBs, PBDEs and PBDOs Prohibited from Products

Name	CAS* Numbers
Bromobiphenyl	2052-07-05, 2113-57-7, 92-66-0
Bromobiphenyl Ether	101-55-3
Decabromobiphenyl	13654-09-06
Decabromobiphenyl Ether	1163-19-5
Dibromobiphenyl	92-86-4
Dibromobiphenyl Ether	2050-47-7
Heptabromobiphenyl	6355-01-8
Heptabromobiphenyl Ether	68928-80-3

Hexabromobiphenyl	59080-40-9, 36355-01-8, 67774-32-7
Hexabromobiphenyl Ether	36483-60-0
Nonabromobiphenyl	27753-52-2
Nonabromobiphenyl Ether	63936-56-1
Octabrombiphenyl	61288-13-9
Octabromobiphenyl Ether	32536-52-0
Pentabromobiphenyl	56307-79-0
Pentabromobiphenyl Ether	32534-81-9
Polybrominated Biphenyl, Polybromobiphenyl(s), Polybromodiphenyl(s)	59536-65-1
Polybrominated Biphenyl Ether, Polybrominated Biphenyl Oxide	No CAS number assigned
Tetrabromobiphenyl	40088-45-7
Tetrabromobiphenyl Ether	40088-47-9
Tribromobiphenyl	51202-79-0
Tribromobiphenyl Ether	49690-94-0

Note: biphenyl is used interchangeably with diphenyl.

Table 3 - Chlorinated Hydrocarbons Prohibited From Products

Name	CAS Numbers
1,1 Dichloroethylene	75-35-4
Pentachloroethane	76-01-7
Methylenechloride	75-09-2
Tetrachloromethane (Carbon Tetrachloride)	56-23-5
1,1,1,2 Tetrachloroethane	630-20-6
1,1,2,2 Tetrachloroethane	79-34-5
Tetrachloroethylene	127-18-4
Trichloromethane (Chloroform)	67-66-3
1,1,2 Trichloroethane	79-00-5
Trichloroethylene	79-01-6
1,1,1-Trichloroethane (TCA)	71-55-6
Bis (chloromethyl) ether	542-88-1
Polychlorinated Phenols such as Pentachlorophenol and its salts	87-86-5
Vinyl Chloride (monomer)	75-01-4

Table 4 - Ozone Depleting Substances and Isomers

Name	CAS Numbers
Trichlorofluoromethane (CFC-11) and its isomers	75-69-4
Dichlorodifluoromethane (CFC-12) and its isomers	75-71-8
Trichlorotrifluoroethane (CFC-113) and its isomers	76-13-1
Dichlorotetrafluoroethane (CFC-114) and its isomers	76-14-2
Monochloropentafluoroethane (CFC-115) and its isomers	76-15-3
Chlorotrifluoromethane (CFC-13) and its isomers	75-72-9 185009-43-2
Pentachlorofluoroethane (CFC-111) and its isomers	354-56-3
Tetrachlorodifluoroethane (CFC-112) and its isomers	76-12-0
Heptachlorofluoropropane (CFC-211) and its isomers	422-78-6 135401-87-5
Hexachlorodifluoropropane (CFC-212) and its isomers	3182-26-1
Pentachlorotrifluoropropane (CFC-213) and its isomers	2354-06-5 134237-31-3
Tetrachlorotetrafluoropropane (CFC-214) and its isomers	29255-31-0 2268-46-4
Trichloropentafluoropropane (CFC-215) and its isomers	1599-41-3 4259-43-2 76-17-5
Dichlorohexafluoropropane (CFC-216) and its isomers	661-97-2
Chloroheptafluoropropane (CFC-217) and its isomers	422-86-6
Bromochlorodifluoromethane (Halon-1211) and its isomers	353-59-3
Bromotrifluoromethane (Halon-1301) and its isomers	75-63-8
Dibromotetrafluoroethane (Halon-2402) and its isomers Carbon tetrachloride	124-73-2
1,1,1-trichloroethane (methyl chloroform) and its isomers except 1,1,2-trichloroethane	71-55-6
Bromomethane (methyl bromide)	74-83-9
Bromodifluoromethane and its isomers(HBFCs)	1511-62-2
These materials may contain isomers that are not listed here. Isomers with CAS numbers have been included when available	

Table 5 – Hydrochlorofluorocarbons and Isomers

Name	CAS Numbers
Dichlorofluoromethane (HCFC-21)	75-43-4
Chlorodifluoromethane (HCFC-22)	75-45-6
Chlorofluoromethane (HCFC-31)	593-70-4
Tetrachlorofluoroethane (HCFC-121)	130879-71-9
1,1,1,2-tetrachloro-2-fluoroethane	354-11-0
1,1,2,2-tetrachloro-1-fluoroethane	354-14-3
Trichlorodifluoroethane (HCFC-122)	41834-16-6
Trichloro-1,1-difluoroethane	354-21-2
Dichlorotrifluoroethane (HCFC-123)	34077-87-7
Dichloro-1,1,2-trifluoroethane	90454-18-5
2,2-dichloro-1,1,1-trifluoroethane	306-83-2
1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)	354-23-4
1,1-dichloro-1,2,2-trifluoroethane(HCFC-123b)	812-04-4
2,2-dichloro-1,1,2-trifluoroethane(HCFC-123b)	812-04-4
Chlorotetrafluoroethane (HCFC-124)	63938-10-3
2-chloro-1,1,1,2-tetrafluoroethane	2837-89-0
1-chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	354-25-6
Trichlorofluoroethane (HCFC-131)	27154-33-2; 134237-34-63
1-Fluoro-1,2,2-trichloroethane	359-28-4
1,1,1-trichloro-2-fluoroethane (HCFC-131b)	811-95-0
Dichlorodifluoroethane (HCFC-132)	25915-78-0
1,2-dichloro-1,1-difluoroethane (HCFC-132b)	1649-08-7
1,1-dichloro-1,2-difluoroethane(HCFC-132c)	1842-05-3
1,1-dichloro-2,2-difluoroethane	471-43-2
1,2-dichloro-1,2-difluoroethane	431-06-1
Chlorotrifluoroethane (HCFC-133)	1330-45-6
1-chloro-1,2,2-trifluoroethane	1330-45-6
2chloro-1,1,1-trifluoroethane (HCFC-133a)	75-88-7
Dichlorofluoroethane (HCFC-141)	25167-88-8
1,1-dichloro-1-fluoroethane (HCFC-141b)	1717-00-6
1,2-dichloro-1-fluoroethane	430-57-9
Chlorodifluoroethane (HCFC-142)	25497-29-4
1-chloro-1,1-difluoroethane (HCFC-142b)	75-68-3
1-chloro-1,2-difluoroethane (HCFC-142a)	25497-29-4
Hexachlorofluoropropane (HCFC-221)	134237-35-73
Pentachlorodifluoropropane (HCFC-222)	134237-36-83
Tetrachlorotrifluoropropane (HCFC-223)	134237-37-93
Trichlorotetrafluoropropane (HCFC-224)	134237-38-03

Dichloropentafluoropropane, (Ethyne, fluoro-) (HCFC 225)	127564-92-5; (2713-09-9)
2,2-Dichloro-1,1,1,3,3-pentafluoropropane(HCFC 225aa)	128903-21-9
2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC 225ba)	422-48-0
1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225bb)	422-44-6
3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC 225ca)	422-56-0
1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC 225cb)	507-55-1
1,1-Dichloro-1,2,2,3,3-pentafluoropropane(HCFC 225cc)	13474-88-9
1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC 225da)	431-86-7
1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225ea)	136013-79-1
1,1-Dichloro-1,2,3,3,3-pentafluoropropane(HCFC 225eb)	111512-56-2
Chlorohexafluoropropane (HCFC-226)	134308-72-83
Pentachlorofluoropropane (HCFC-231)	134190-48-03
Tetrachlorodifluoropropane (HCFC-232)	134237-39-1
Trichlorotrifluoropropane (HCFC-233)	134237-40-4
1,1,1-trichloro-3,3,3-trifluoropropane	7125-83-9
Dichlorotetrafluoropropane (HCFC-234)	127564-83-4
Chloropentafluoropropane (HCFC-235)	134237-41-5
1-chloro-1,1,3,3,3-pentafluoropropane (HCFC-235fa)	460-92-4
Tetrachlorofluoropropane (HCFC-241)	134190-49-1
Trichlorodifluoropropane (HCFC-242)	134237-42-6
Dichlorotrifluoropropane (HCFC-243)	134237-43-73
1,1-dichloro-1,2,2-trifluoropropane	7125-99-7
2,3-dichloro-1,1,1-trifluoropropane (HCFC-243da)	338-75-0
3,3-dichloro-1,1,1-trifluoropropane	460-69-5
Chlorotetrafluoropropane (HCFC-244)	134190-50-4
3-chloro-1,1,2,2-tetrafluoropropane	679-85-6
Trichlorofluoropropane (HCFC-251)	134190-51-5
1,1,3-trichloro-1-fluoropropanene	818-99-5
Dichlorodifluoropropane (HCFC-252)	134190-52-6
Chlorotrifluoropropane (HCFC-253)	134237-44-8
3-chloro-1,1,1-trifluoropropane	460-35-5
Dichlorofluoropropane (HCFC-261)	134237-45-9
1,1-dichloro-1-fluoropropane	7779-56-6
Chlorodifluoropropane (HCFC-262)	134190-53-7
2-chloro-1,3-difluoropropane	102738-79-4
Chlorofluoropropane (HCFC-271)	134190-54-83
2-chloro-2-fluoropropane	420-44-0
These materials may contain isomers that are not listed here. Isomers with CAS numbers have been included when available.	

Table 6 - Hydrofluorocarbons and Isomers

Name	CAS* Numbers
Fluoroform, Trifluoromethane (HFC-23)	75-46-7
Difluoromethane (HFC-32)	75-10-5
1,1,1,2,3,4,4,5,5,5-decafluoropentane, 2H,3H-Decafluoropentane (HFC-43-10)	138495-42-8
Pentafluoroethane (HFC-125)	354-33-6
1,1,1,2-Tetrafluoroethane, tetrafluoroethane (HFC-134a)	811-97-2
1,1,1-Trifluoroethane (HFC-143a)	420-46-2
1,1-Difluoroethane, difluoroethane (HFC-152a)	75-37-6
1,1,1,2,3,3,3-Heptafluoropropane, heptafluoropropane (HFC-227ea)	431-89-0
1,1,1,3,3,3-hexafluoropropane (HFC-236fa)	690-39-1
1,1,2,2,3-pentafluoropropane (HFC-245ca)	679-86-7
Perfluoromethane,	75-73-0
Perfluoroethane	76-16-4
Perfluorobutane	355-25-9

Table 7 - Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Name	CAS* Numbers
Bis(tri-n-butyltin) oxide	56-35-9
Triphenyltin N,N'-dimethyldithiocarbamate	1803-12-9
Triphenyltin fluoride	379-52-2
Triphenyltin acetate	900-95-8
Triphenyltin chloride	639-58-7
Triphenyltin hydroxide	76-87-9
Triphenyltin fatty acid salts (C=9-11)	47672-31-1
Triphenyltin chloroacetate	7094-94-2
Tributyltin methacrylate	2155-70-6
Bis(tributyltin) fumarate	6454-35-9
Tributyltin fluoride	1983-10-4
Bis(tributyltin) 2,3-dibromosuccinate	31732-71-5
Tributyltin acetate	56-36-0
Tributyltin laurate	3090-36-6
Bis(tributyltin) phthalate	4782-29-0
Copolymer of alkyl acrylate, methyl methacrylate and tributyltin Methacrylate(alkyl; C=8)	No CAS number assigned

Tributyltin sulfamate	6517-25-5
Bis(tributyltin) maleate	14275-57-1
Tributyltin chloride	1461-22-9
Mixture of tributyltin cyclopentanecarboxylate and its analogs (Tributyltin naphthenate)	No CAS number assigned
Mixture of tributyltin 1,2,3,4,4a, 4b, 5,6,10,10a-decahydro-7-isopropyl-1, 4a-dimethyl-1-phenanthlenecarboxylate and its analogs (Tributyltin rosin salt)	No CAS number assigned
Other Tributyl Tins & Triphenyl Tins	No CAS number assigned

Table 8 - Radioactive Substances (Radioactive Isotopes)

Name	CAS* Numbers
Uranium	7440-61-6
Plutonium	7440-07-5
Radon	10043-92-2
Americium	7440-35-9
Thorium	7440-29-1
Cesium (Radioactive Isotopes only)	7440-46-2
Strontium (Radioactive Isotopes only)	7440-24-6

Table B. General Specification for the Environment –Packaging Requirements

Substance/item	Threshold weight % (ppm)
Ozone Depleting Substances	Must not be used in plastic foam packaging materials
Heavy Metals	Lead, mercury, cadmium, or hexavalent chromium greater than 0.01% (100 ppm) by weight.
Polyvinyl Chloride (PVC)	1. Must not be used. 2. This restriction does not apply to protective tape covers with a surface area equal to or less than 15 square centimeters (2.35 square inches) and or weighing less than 1 g (0.035 oz).

Table C. Substance restrictions for halogen-free products and components

Substance/item	Threshold weight % (ppm)
Bromine	≦900 ppm (0.09 wt%)
Chlorine	≦900 ppm (0.09 wt%)
Bromine and Chlorine	≦1500 ppm (0.15 wt%)

Table D. Elimination of intentionally added hazardous substances

Item	Description	Criteria
Elimination of intentionally added cadmium	All covered products shall have concentrations of cadmium less than half the threshold defined in RoHS, unless the presence of cadmium can be shown to be due to use of recycled content.	Less than 50 ppm
Low threshold for amount of mercury used in light sources	All flat panel video display devices shall use lamps that contain a reduced amount of mercury relative to the current industry standard.	3.0mg
Elimination of intentionally added lead in certain applications (Applies to VDUs only)	Video display units shall have concentrations of lead less than 5 percent of the threshold defined in the RoHS Directive per listed part, unless the presence of lead can be shown to be due to use of recycled content.	Less than 50 ppm
Elimination of intentionally added hexavalent chromium	All covered products shall have concentrations of hexavalent chromium that are less than half the threshold defined in the RoHS Directive, unless the presence of hexavalent chromium can be shown to be due to use of recycled content.	Less than 500 ppm
Polyvinyl chloride and chlorinated plastics	In all covered products, except cables and interconnect parts, parts greater than 25 grams shall not contain polyvinyl chloride (PVC).	N.D. (Not Detected)
R45,R46,R50,R51,R52,R60,R61 (European Council Directive 67/548/EEC)	Plastic parts >25 g shall be free from flame retardants (not more than 0.1% of total weight) that are classified as dangerous substances under European Council Directive 67/548/EEC.	Less than 1000 ppm

Appendix 附件

☐ **1.** Cadmium in electrical contacts and the plating of electrical contacts, for which high reliability is required and which has no substitute materials. 鎘用於有高度安全標準或高度可靠度需求之電性接點與鎘鍍層。

☐ **2.** Cadmium in optical glass, filter glass. 鎘用於光學玻璃及濾光玻璃。

☐ **3.** Lead in high-melting temperature type solder for internal connections used for modules, parts and devices. (i.e. lead based alloys containing 85wt% or more) 鉛用於高熔點用途之銲錫(含鉛量在 85 wt%以上之銲錫)。

☐ **4.** Lead in solder for server, storage and storage array system, network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunications. 鉛用於伺服器、儲存器與存取陣列系統和交換、信號產生和傳輸，以及電信網路管理的網路基礎建構設備之銲錫。

☐ **5.** Lead in electronic ceramic parts. (e.g. piezoelectric elements, dielectric ones, and magnetic ones [ferrites]) 鉛用於電子陶瓷零部件，如壓電元件、介電元件及磁性(鐵氧材質)元件等。

☐ **6.** Lead in optical glass, filter glass. 鉛用於光學玻璃、濾光玻璃。

☐ **7.** Lead in glass materials used for modules, electrical parts, cathode-ray tubes, or vacuum fluorescent displays. The glass materials include adhesives, resistor elements, glass frit, conductive pastes (silver or copper ones), and sealing materials. 鉛使用於外購模組、電子零件、陰極射線管或真空螢光顯示器的玻璃材料，包含黏著劑、電阻體、玻璃材質、導電膏(銀膏或銅膏)與密封材料。

☐ **8.** Lead in solder consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80wt% and less than 85wt%. 鉛用於微處理器構裝與接腳間之連接用(含有兩種元素以上)銲錫(鉛含量為 80wt%-85wt%)。

☐ **9.** Lead in solder to complete a viable electrical connection between semiconductor die and carrier within integrated circuit Flip Chip packages. (e.g. solder pastes used under C4 [Controlled Collapse Chip Connection] bumps) 鉛用於覆晶構裝中半導體晶片與承載電路板間電性訊號連接用之銲錫(包含如 C4- Controlled Collapse Chip Connection 銲錫凸塊之錫膏)。

☐ **10.** Lead in lead-bronze bearing shells and bushes. 鉛用於青銅材質之軸承殼及軸襯。

☐ **11.** Lead in a coating material for the thermal conduction module C-ring. 鉛用於熱傳導模組之 C-ring 環組的鍍層材料。

☐ **12.** Lead in the compliant pin connector systems. 鉛用於插接式連接器系統(銲接式連接器除外)，如插接腳之表面鍍層。

☐ **13.** Lead as an alloying element in steel should less than 0.35 wt%. 鋼合金中的鉛允許濃度需在 0.35%以下。

☐ **14.** Lead as an alloying element in aluminum should less than 0.4 wt%. 鋁合金中的鉛允許濃度需在 0.4%以下。

☐ **15.** Lead as an alloying element in copper (including brass and phosphor bronze) should less than 4 wt%. 銅合金(包含黃銅及磷青銅)中的鉛允許濃度需在 4%以下。

☐ **16.** Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCD). LCD 中用於保護平面螢光燈之前後支撐物的玻璃中可含氧化鉛。

☐ **17.** Lead in solders for the soldering to machine through whole discoidal and planar array ceramic multilayer capacitors. 通孔盤狀及平面陣列陶瓷多層電容器焊料所含的鉛。

☐ **18.** Lead alloys as solder for transducers used in high-powered (designated to operate for several hours at acoustic power levels of 125 dB SPL and above) loudspeakers. 在大功率揚聲器中作為轉換器焊料的鉛合金。

☐ **19.** Mercury in lamps other than small-sized fluorescent lamps and straight-tube ones. (e.g. High-pressure mercury lamps). 汞用於小型及直式螢光燈管以外的其他燈管，如高壓汞燈、液晶顯示器背光燈。

☐ **20.** PVC in binders made of resin. PVC 用於樹脂作成之黏合劑。

☐ **21.** PVC in polyvinyl electrical wires for high voltage. PVC 用於高電壓使用聚乙烯電線材。

☐ **22.** PVC in insulating tapes. PVC 用於絕緣膠帶。

☐ **23.** PVC in speaker grilles. PVC 用於揚聲器拖架。

☐ **24.** PVC in power supply cords for import into EU countries. PVC 用於出口至歐洲之電源供應線材。

☐ **25.** PVC in transformer leads of which the joint is fixed by varnish impregnation. PVC 用於接腳部位經清漆浸漬之變壓器。

☐ **26.** PVC in curl cords. PVC 用於捲線。

☐ **27.** PVC in extra fine electrical wires that are AWG (American Wire Gauge) 36 or more. PVC 用於高於 AWG(American Wire Gauge) 36 規格之極細式電線材。

☐ **28.** Use of PVC and PVC blends in the professional-use cables, to which general-purpose ones cannot be applied (e.g. cables for broadcast cameras and microphones). PVC 用於使用聚氯乙烯或聚氯乙烯混合物之專業用途線材(普通線材無法其應用要求)，如廣播電視所使用之攝影機電線材、麥克風電線材等。

☐ **29.** PFOS in mist suppressants for nondecorative hard chromium (VI) plating and wetting agents for use in controlled electroplating systems. 全氟辛烷硫磺酸(PFOS)用於電鍍鉻抑制劑及濕潤劑。

☐ **30.** Cadmium, lead, mercury and hexavalent chromium in cartons for returnable boxes owed by modules and parts suppliers. 鎘、鉛、汞及六價鉻用於外購模組及零部件供應商使用之可回收產品搬運箱。

☐ **31**. 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. 使用於聲壓大於或等於 100 分貝的高功率音箱中的音圈轉換器上的電導體的電子或機械焊點中的鎘合金。

☐ **32.** Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting). 於無汞平面螢光燈(使用於液晶顯示器、設計或工業照明設備)中焊錫內含的鉛。

☐ **33**. Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes. 封裝氬和氪雷射管的氧化鉛。