



广东惠伦晶体科技股份有限公司
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PRODUCT SPECIFICATION SHEET

CUSTOMER : _____
PRODUCT TYPE : SMD TSX 2.5*2.0
NOMINAL FREQ. : 26.000000 MHz
FL P/N : 2Z26000006
REVISION : A2
CUSTOMER P/N : _____

CUSTOMER'S APPROVAL&DATE

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FL CORPORATION

APPROVED	CHECKED	DESIGNED
Yasuda Katsushi	Jin Qi	Yasuda Katsushi

RoHS Compliant



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ATTACHMENT (optional)

- | | | | |
|------------------------------------|---|------------------------------|--|
| • ELECTRICAL CHARACTERISTICS TEST | A | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| • TEMPERATURE CHARACTERISTICS TEST | B | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |



PRODUCT DESCRIPTION

Standard atmospheric conditions

Unless otherwise specified. The standard range of atmospheric conditions for making measurement and tests are as follow:

Ambient temperature $25\pm 10^{\circ}\text{C}$
 Relative humidity 40%~70%

If there is no doubt the results, measurement shall be made within the following limits:

Ambient temperature $25\pm 2^{\circ}\text{C}$
 Relative humidity : 40%~70%

Measure equipment

Electrical characteristics measured by S&A250B or equivalent.

Crystal cutting type

The crystal is using AT CUT (thickness shear mode)

ELECTRICAL SPECIFICATIONS

No.	Items	Electrical Spec.					Remarks
		Symbol	Min	Typ	Max	Units	
1	Nominal Frequency	FL	-	26	-	MHz	-
2	Oscillation Mode	-	AT-cut Fundamental			-	-
3	Load Capacitance	CL	-	7.0	-	pF	-
4	Frequency Tolerance	dF	-10	-	10	ppm	at $25\pm 2^{\circ}\text{C}$
5	Frequency Temperature Characteristics	dFr	-10	-	10	ppm	at $-30\sim +85^{\circ}\text{C}$ (reference 25°C)
6	Frequency drift after reflow	-	-2	-	2	ppm	After two reflows (0.5Hr freq. drift substruct 168Hr freq.)
7	Aging (/1 year)	Fa	-0.7	-	0.7	ppm/year	at $25\pm 2^{\circ}\text{C}$
8	Aging (/2 year)		-1.4	-	1.4	ppm/2year	
9	Aging (/5 year)		-2.5	-	2.5	ppm/5year	
10	Aging (/10 year)		-5	-	5	ppm/10year	
11	Operating Temperature	-	-30		+105	$^{\circ}\text{C}$	-
12	Storage Temperature	-	-40		+105	$^{\circ}\text{C}$	-
13	Equivalent series resistance	ESR	-	-	30	ohms	-
14	Tuning Sensitivity	S	25.2	28	30.8	ppm/pF	-
15	Spurious mode series resistance	-	500	-	-	ohms	$\pm 500\text{ kHz}$
16	Q	-	75000	-	-	-	-
17	Insulation Resistance	IR	500	-	-	M-ohms	at DC 100V
18	Drive Level	Pd	0.01	0.05	0.15	mW	-



ELECTRICAL SPECIFICATIONS

No.	Items	Electrical Spec.					Remarks
		Symbol	Min	Typ	Max	Units	
19	Inflection point	Ti	27	28.5	30	°C	
20	Room temperature	T0	-	28.5	-	°C	
21	1st order coefficient	C1	-0.35	-0.225	-0.1	ppm/°C	Ta=-40 to +85°C per 1°C (Note 1)
22	2nd order coefficient	C2	-4.5	0	4.5	x10 ⁻⁴ ppm/°C ²	
23	3rd order coefficient	C3	8.7	9.85	11.0	x10 ⁻⁵ ppm/°C ³	
24	Frequency slope error 1	-	-0.05	-	0.05	ppm/°C	'at -10~+60°C (Note 2)
25	Frequency slope error 2	-	-0.1	-	0.1	ppm/°C	'at -30~+85°C (Note 2)
26	Frequency slope error 3	-	-0.15	-	0.15	ppm/°C	'at -40~+30°C (Note 2)
27	Full Cycle Temperature Hysteresis	-	-0.5	-	0.5	ppm	'at -30~+85°C (Note 3)
28	Small Cycle Temperature Hysteresis	-	-0.05	-	0.05	ppm	(Note 4)
29	Full Cycle Frequency stability slope	-	-50	-	50	ppb/°C	(Note 5)
30	5°C Small Cycle Frequency stability slope 1	-	-50	-	50	ppb/°C	(Note 5)
31	5°C Small Cycle Frequency stability slope 2	-	-	-	100	ppb (peak to peak)	Average measured peak-to-peak frequency difference (Note 5)
32	DLD Freq (Max-Min)	FDDL			2.0	ppm	Drive Level 10nW~100uW Step Ratio is sqrt10
33	DLD Freq (Repeatability)	FDLH			0.7	ppm	
34	DLD ESR (Max-Min)	DLD2			2.5	ohms	
35	DLD ESR (Repeatability)	DLDH 2			1.5	ohms	

Note 1 Measure FT points every 1°C, heating up from -40 to 85°C, substrat a third-order polynomial best fit.

$$F(T) = C3(T-T_0)^3 + C2(T-T_0)^2 + C1(T-T_0); T_0 = 28.5°C$$

Note 2 Measure FT points every 1°C, heating up from -40 to 85°C, subtract a third-order polynomial best fit, and then calculate the slope of the residual.

Note 3 Temp. range:-30 to 85°C for each 1°C, Temp. rate: ~1.0°C/min

Test flow: 25°C(1)->-30°C->85°C->25°C(2), (25°C(1) freq. drift subtract 25°C(2) freq. drift)

Note 4 Temp. range:-30 to 85°C for each 0.5°C, Temp. rate: ~1.0°C/min, Test flow: any 5°C cycle (ex.25°C(1)->-30°C->25°C(2), 25°C(1) freq. drift subtract 25°C(2) freq. drift)

Note 5 Test condition: Continuous temperature rate change of~ 1.0°C/min

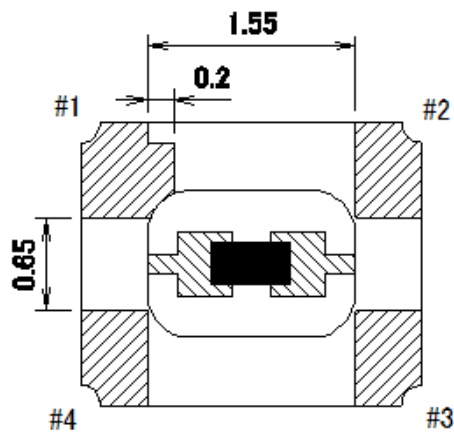
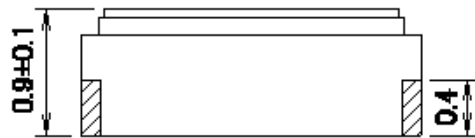
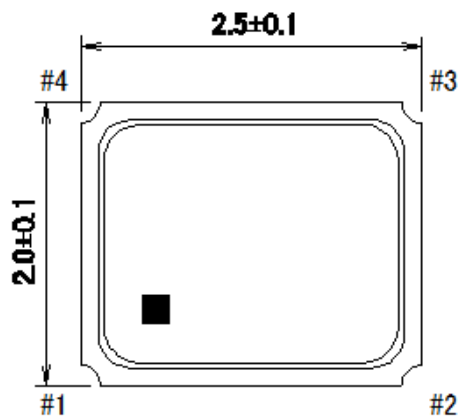
Measure FT points every 1°C, heating up from -30 to 85°C, subtract a fifth-order polynomial best fit, and then calculate the slope of the residual.



NTC THERMISTOR SPECIFICATIONS TABLE

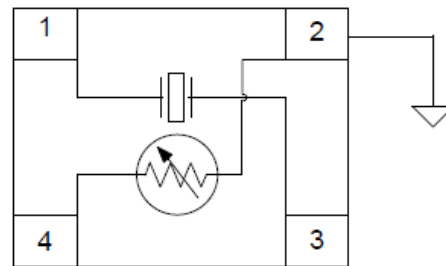
No.	Items	Electrical Spec.					Remarks
		Symbol	Min	Typ	Max	Units	
1	Resistance	-	-	100	-	k-ohms	at 25°C
2	B-constant	-	-	4250	-	K	at 25°C - 50°C
3	Tolerance	-	-1	-	1	%	

DIMENSIONS



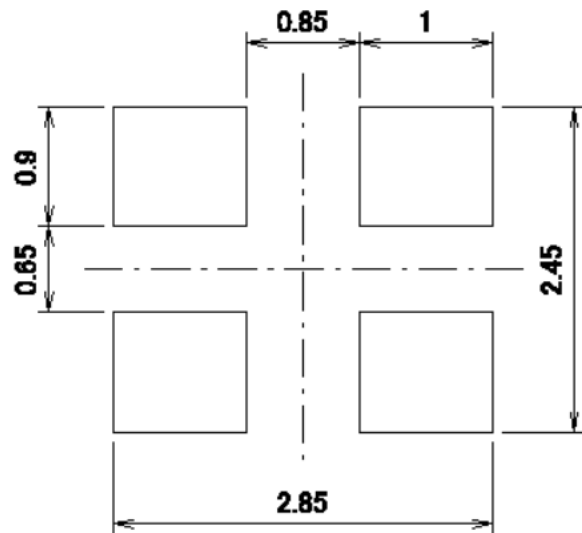
Unit :

CONNECTION DIAGRAM



Pin	Function
#1	Xtal terminal (Input)
#2	Thermistor + GND terminal
#3	Xtal terminal (Output)
#4	Thermistor terminal

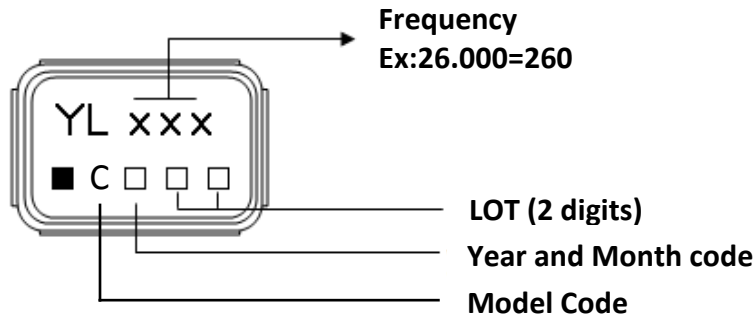
SUGGESTED LAYOUT



Unit :



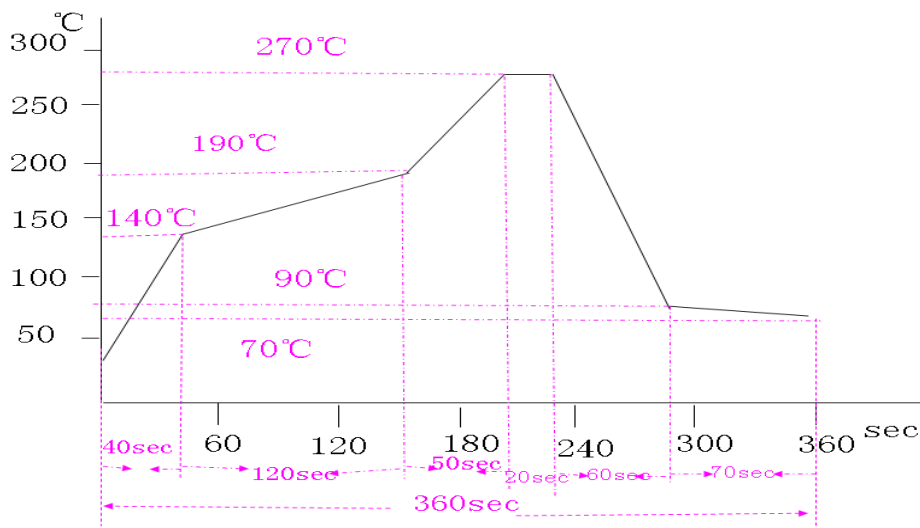
MARKING



		month											
year		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2017	2021	A	B	C	D	E	F	G	H	J	K	L	M
2018	2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2019	2023	a	b	c	d	e	f	g	h	j	k	l	m
2020	2024	n	p	q	r	s	t	u	v	w	x	y	z

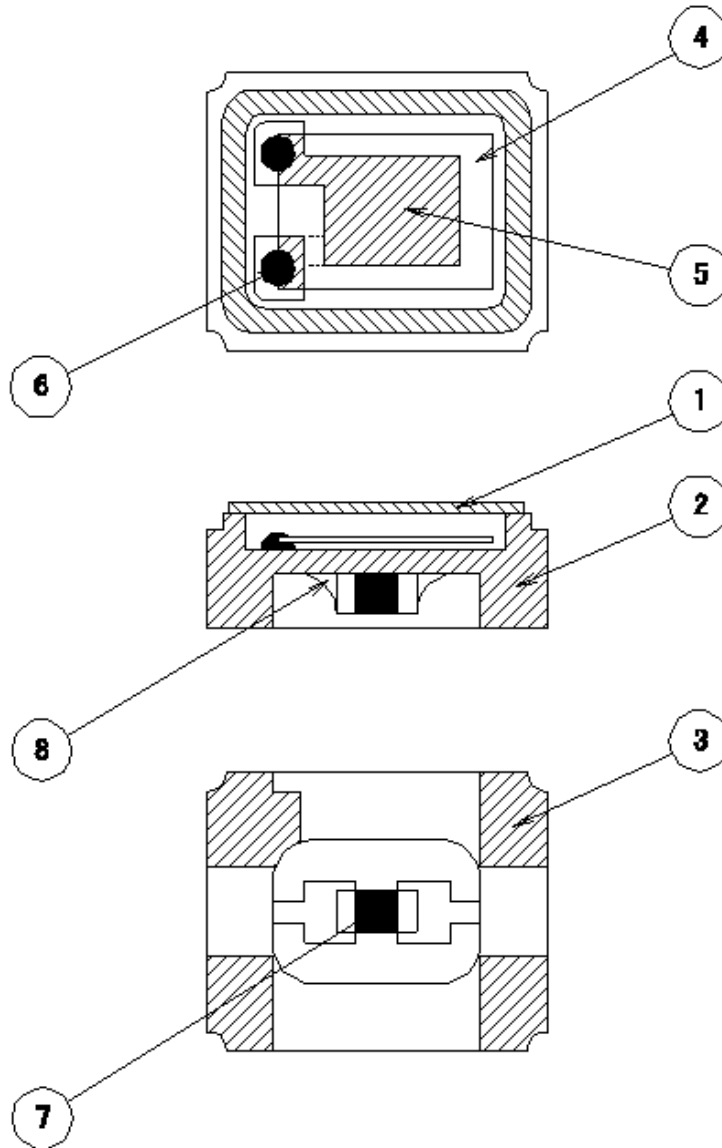
SUGGESTED REFLOW PROFILE

Total time : 360 sec. Max.
 Solder melting point : 185 °C





STRUCTURE ILLUSTRATION



NO	COMPONENTS	MATERIALS	QTY	FINISH/SPECIFICATIONS
1	Cap(Lid)	Kovar(Fe+Co+Ni)	1	Ni plating
2	Base(Package)	Alumina Ceramics (Al ₂ O ₃) + Kovar (Fe+Co+Ni)	1	-
3	Pad(Package)	Ni + Au	4	-
4	Crystal Blank	SiO ₂	1	-
5	Conductive Adhesive	Ag	2	Silicone resin
6	Electrode	Cr + Nobel material	2	-
7	Thermistor	Alumina Ceramics (Al ₂ O ₃), Ni + Ag+ Sn	1	-
8	Solder	Sn + Ag + Cu	2	-

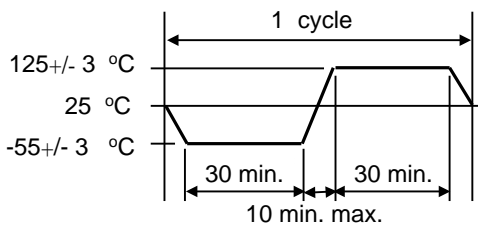


RELIABILITY SPECIFICATIONS

1.MECHANICAL ENDURANCE

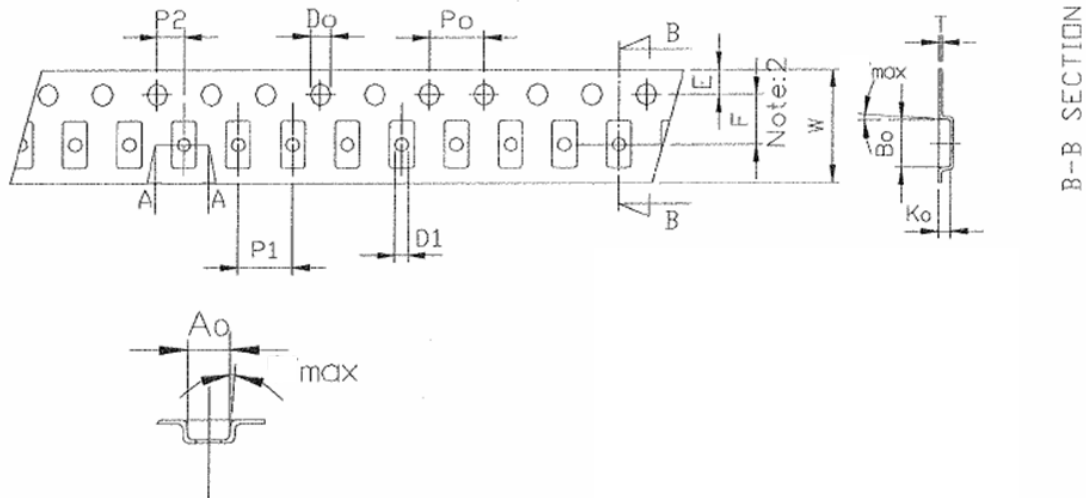
No.	Test Item	Test Methods	
1	Drop Test	150 cm height, fall freely onto stainless plate 3 times.	
2	Shock Test	150g/150cm Height,3times in the direction of $\pm x$, $\pm y$, $\pm z$ on concrete floor	
3	Mechanical Shock	Device are shocked to half sine wave (1000 G) three mutually pendicular axes each 3 times. 1.0m sec. duration time	
4	Vibration	Frequency range Amplitude Pendicular axes each test time Total test time	10 ~ 55 Hz 1.52 mm 2 hours (x,y,z Axis) 6 hours
5	Gross Leak	Standard Sample For Automatic Gross Leak Detector Test Pressure 2kg/cm2	
6	Fine Leak	Helium Bombing 4.5kgf/cm2 for 2 hr	
7	Solderability	Temperature Immersing depth Immersion time Flux	215 °C +/- 5 °C 0.5 mm minimum 10 +/- 0.5 seconds Rosin resin methyl alcohol solvent (1 : 4)
8	Resistance To Soldering Heat	Pre-heat temperature Pre-heat time Test temperature Test time	125 °C 60 ~ 120 sec. 260 +/- 5 °C 5 +/- 1 sec.

2.ENVIRONMENTAL ENDURANCE

No.	Test Item	Test Methods	
9	High Temp. Storage	+ 125 °C +/- 3 °C for 500 +/- 12 hours	
10	Low Temp. Storage	- 40 °C +/- 3 °C for 500 +/- 12 hours	
11	Thermal Shock	Total 100 cycles of the following temperature cycle 	
12	High Temp&Homidity	85°C±3°C, RH 85%,500Hrs	
13	Pressure Cooker Storage	121 +/- 3°C, RH100%, 2 bar, for 240 hours	



PACKING : (EIA-481-2)



Dimension / PKG Type	Unit : mm						
	A0	B0	K0	T	W	E	F
2520 TSX(8mm)	2.25±0.1	2.70±0.1	1.45±0.1	0.25±0.05	8±0.3	1.75±0.1	3.50±0.1
	P1	P2	D1	D0	P0		
	4±0.1	2±0.1	1±0.1	1.55±0.05	4±0.1		

Standard Reel Quantity is 3,000 pcs per reel.

THE INSPECTION FOR TAPE TENSION


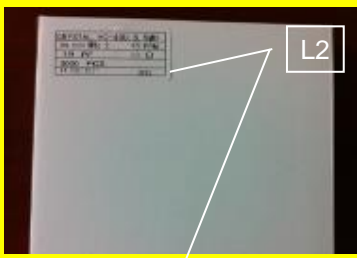


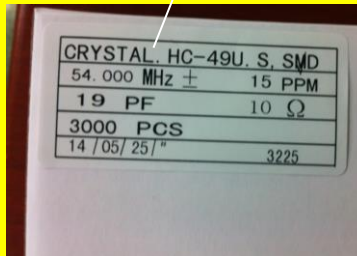

ITEM		Defect	Method
Appearance	ALL	1.The tape is not coincidence 2.The bubble	Visual inspection
Tape Tension	8045、7050 6035-12mm 5032-12mm 3225-12mm	overstep 61±6g(55~67g)	Pull test
	3225-8mm	overstep 40±5g(35~45g)	
	2520-8mm	overstep 55±6g(49~61g)	
	2016-8mm	overstep 34±6g(28~40g)	
	1612-8mm	overstep 34±6g(28~40g)	
	6035-16mm 5032-16mm	overstep 60±6g(54~66g)	

REMARK : NA


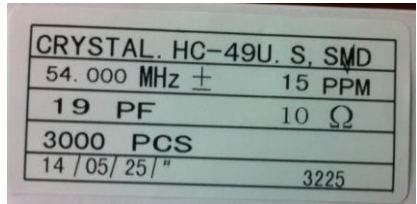
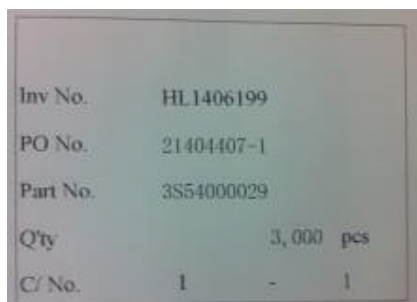


SMD PRODUCT PACKING STANDARD

Out-going packing instruction

Reel Packing	Inner Packing	Carton
name: reel standard: diameter 18cm material: plastics	name: inner box standard: L19.0xW19.0xH2.5cm material: B corrugated paper	name: carton standard: L34.0xW22.0xH22.0cm material: AB corrugated paper(10 boxes enter)
		
		

The label instruction

Label Drawing	Mark	Name of Article	Spec.	Size	Printing
	L1	条码标签 Bar Code Label (Chintz Paper)	1.Date Code 2.Lot No. 3.Part No. 4.Freq 5.Q'ty	75x35mm	White
	L2	机打标签 Printing Label (Printing Paper)	1.Freq 2.Electrical Parameters 3.Q'ty 4.Part No. 5.Packing Date	75x35mm	White
	L3	运输标签(唛头) Shipping Mark (Printing Paper)	1.inv No. 2.PO No. 3.Part No. 4.Q'ty 5.C/No.	100x100m m	White

Remark

Specifications on the label is for the use of templates with different product specifications may vary.
 If customer specified requirements for labels packaging, please provide the operation procedure.



Range	Products	Packing Material	Test Method
Banned Substances	Maximum concentration ppm(mg/kg)	Maximum concentration ppm(mg/kg)	
1.镉及镉化合物 Cadmium and cadmium compounds	5	5	ICP-AES as per EN1122, method B2001 or other acid digestion.
2.铅及铅化合物 Lead and lead compounds	40	100	ICP-AES after as per EPA 3050B or other acid digestion.
3.汞及汞化合物 Mercury and mercury compounds	5	5	ICP-AES after as per EPA 3052 or other acid digestion.
4.六价铬化合物 Hexavalent-Chromium VI (Cr+6)	10	10	As per US EPA 7196A and US EPA 3060A.
5.聚溴联苯 PBB Polybrominated biphenyls	5	5	With reference to USEPA 3540 or USEPA3550. Analysis was performed by LPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS),83/261/EEC, and76/769/EEC)
6.聚溴二苯醚 PBDE Polybrominated diphenyl ethers	5	5	With reference to USEPA3540or USEPA3550. Analysis was performed by HPLC/DAD LC/MS or GC/MS.(prohibited by 2002/95/EC(RoHS), 83/264/EEC, and 76/769/EEC)
7.多氯联苯 (PCB) Polychlorinated biphenyl	5	5	
8.多氯化萘 (PCN) Polychlorinated naphthalene	5	5	
9.氯代烷烃 (CP) Chlorinated paraffin	5	5	
10.其他有机氯化物 Other chlorinated organic compounds	5	5	
11.其他有机溴化合物 Other brominated organic compounds	5	5	
12.有机锡化合物 (三丁基锡化合物,三苯基锡化合物) Organic tin compounds (Tributyl tin category & Triphenyl tin category)	5	5	
13.石棉 Asbestos	5	5	
14.偶氮化合物 Azo compounds	5	5	
15.甲醛 Formaldehyde	5	5	
16.聚氯乙烯(PVC)以及聚氯乙烯混合物 Polyvinyl chloride (PVC) and PVC blends	No detect	No detect	
17.包装材料中重金属(汞、镉、六价铬、铅、PBB、PBDE)之总量 Heavy metals (mercury, cadmium, lead, Cr+6,PBB and PBDE) in packing	N/A	<100	

Lead Free Products are “Directive 2002/95/EC of The European Parliament of 27 January 2003 on the restriction of certain hazardous substances (RoHS) in electrical and electronic equipment” and Sony SS-00259 Compliant.



惠伦晶体
FAILONG CRYSTAL