



HOSONIC ELECTRONIC CO., LTD.



SMD CRYSTAL UNIT SPECIFICATIONS

Customer	FOXCONN
Customer P/N	
Product	3225 Seam Sealing Crystal
Nominal Frequency	24.000000MHz
HOSONIC P/N	E3SB24E00005JE
Version	10C0
Issue Date	2017/8/17

HOSONIC		
Drawn	Checked	Approved
LUCY	ZOE	JOHN

Approved By Customer : _____



HOSONIC ELECTRONIC CO., LTD.



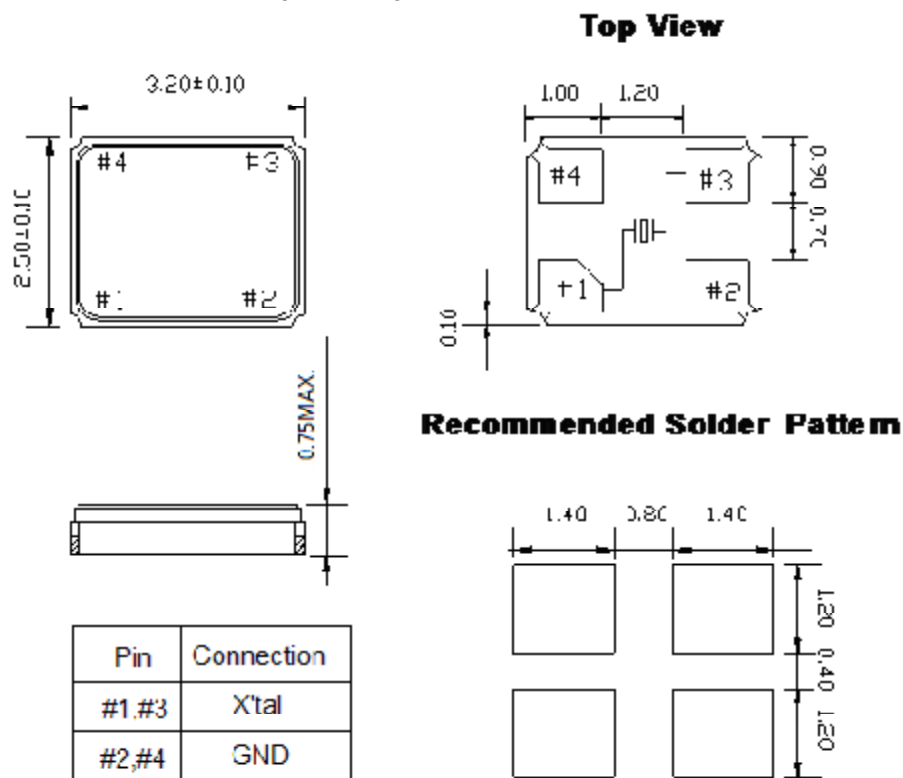
● **ELECTRICAL PARAMETERS**

Electrical characteristics measured by S&A250B or equivalent.

No.	Item	Symb.	Electrical Specification				Remark
			Min.	Typ.	Max.	Units	
1	Nominal Frequency	F0	24.000000				MHz
2	Crystal cutting type		AT cut				
3	Mode of Vibration		Fundamental				
4	Frequency Tolerance	$\Delta F/F0$	-10	-	10	ppm	At 25°C±3°C
5	Operating Temperature Range	T _{OPR}	-40	-	105	°C	
6	Frequency Stability (over operating temperature)	TC	-20	-	20	ppm	Ref. to 25°C
7	Storage Temperature	T _{STG}	-55	-	125	°C	
8	Load capacitance	CL	-	12	-	pF	
9	Equivalent Series Resistance	ESR	-	-	30	Ω	
10	Drive Level	DL	-	100	-	μW	
11	Insulation Resistance	IR	500	-	-	MΩ	At 100V _{DC}
12	Shunt Capacitance	C0	-	0.96	3	pF	
13	C0/C1		-	315	-		±30%
14	Pulling Sensitivity	TS	-	9.3	-	ppm/pF	
15	RLD2		-	-	50	Ω	
16	DLD2		-	-	10	Ω	
17	SPDB		-	-	-3	dB	±5000ppm
18	Aging Per Year	Fa	-2	-	2	ppm	First Year
19	Unit weight		-	0.017	-	g/pcs	±15%
20	Package type	E3SB					

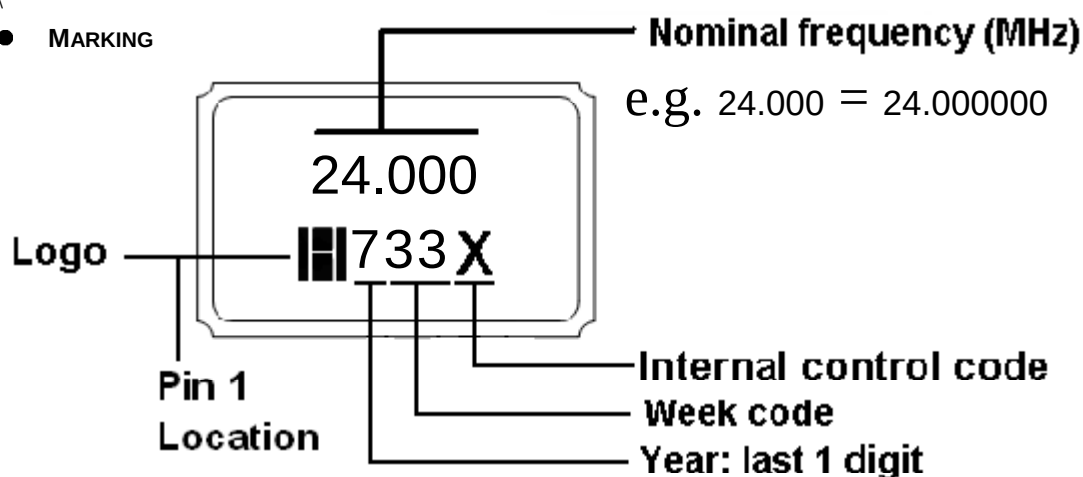
NOTE: Storage Temperature is only for the product itself,the temperature for the packing material is -4~40°C .

● **OUTLINE DIMENSIONS (UNIT: mm)**

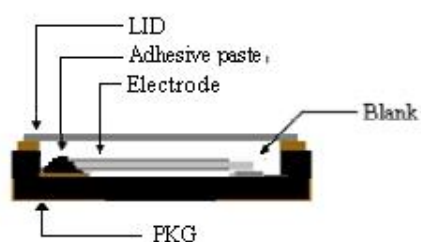
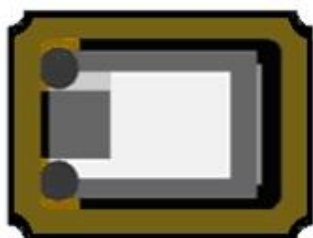


*unlabeled tolerance: $\pm 0.1\text{mm}$

● **MARKING**



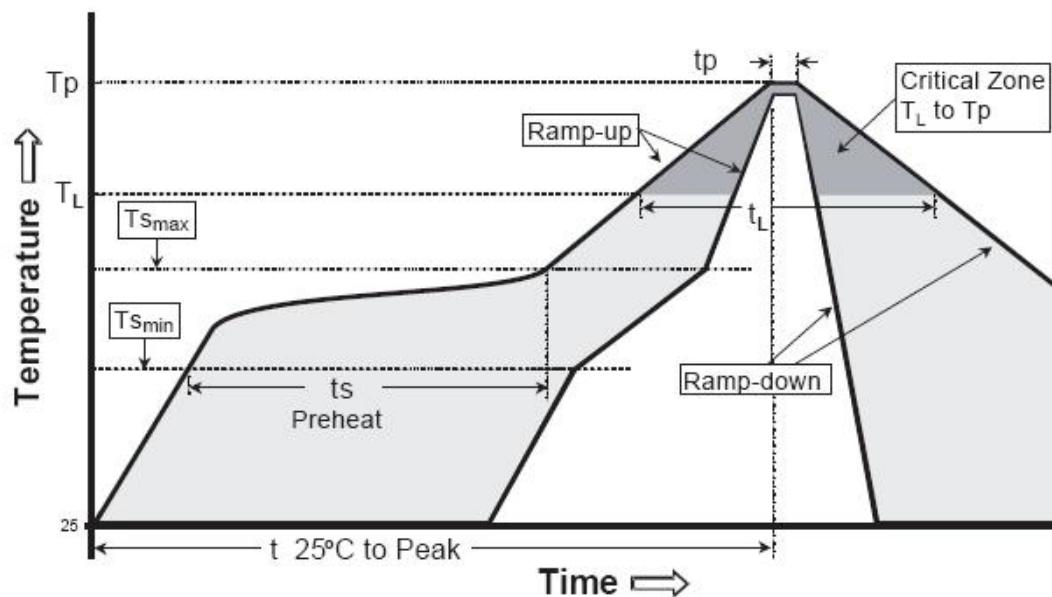
● **PRODUCT LAYOUT**



NO.	Part	Material	Remark
1	LID	KOVAR(Fe+Co+Ni alloy)	
2	PKG	Al ₂ O ₃	Base Surface plating(Pad): Nickel:1.27~8.89μm Au:0.2~1.0μm
3	Blank	SiO ₂	Quartz
4	Adhesive paste	Ag/Silicon	Support
5	Electrode	Noble metal	

● REFLOW PROFILES

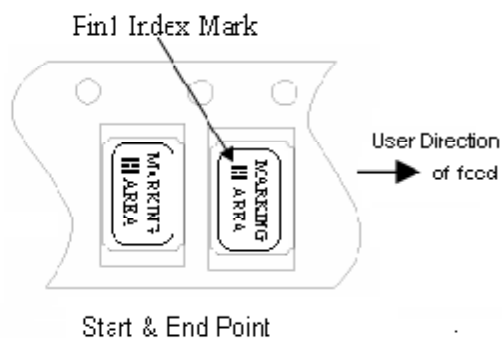
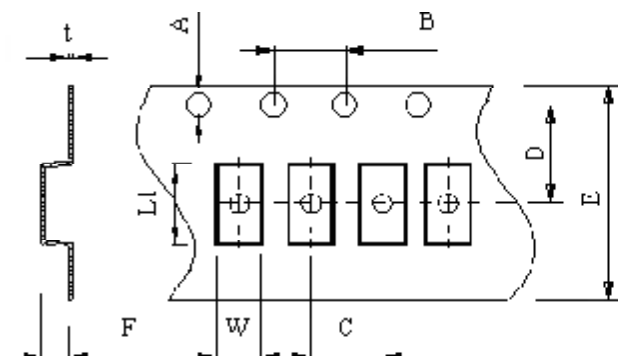
Profiles Feature	Pb-Free Assembly
Average Ramp-up Rate (Ts max to Tp)	3°C/second max.
Preheat ■ Temperature Min (Ts min) ■ Temperature Max (Ts max) ■ Time (ts min to ts max)	125°C 200°C 60~180 Sec.
Time maintained above ■ Temperature (T_L) ■ Time (t_L)	217°C 60~150 Sec.
Peak/Classification Temperature (Tp)	260°C
Time within 5°C of actual Peak Temperature (t _p)	20~40 Sec.
Ramp-down rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.
Suggest reflow times	3 Times max



Remark: To reference JEDEC J-STD-020C

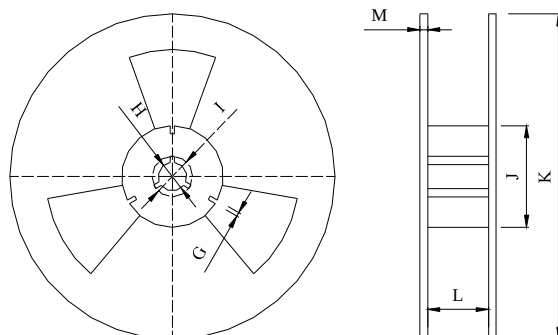
● **PACKAGE(reference to EIA-481)**

Tape Dimensions(unit : mm)



A	B	C	D	E	F	L1	W	t
1.50	4.0	4.0	3.5	8.0	1.0	3.4	2.7	0.3

Reel Dimensions(unit: mm)



G	H	I	J	K	L	M
2.5	13.5	21.6	60.0	178	9.5	1.6

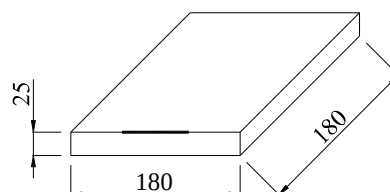
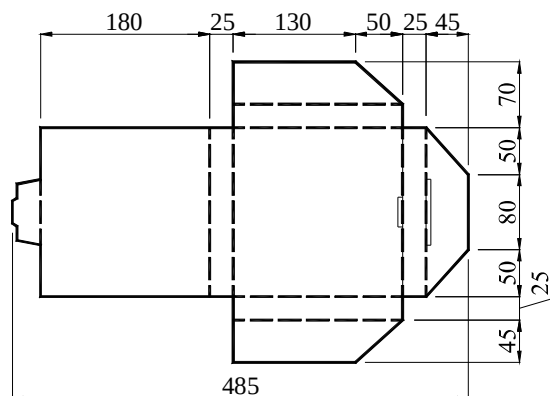
*3000pcs/Reel



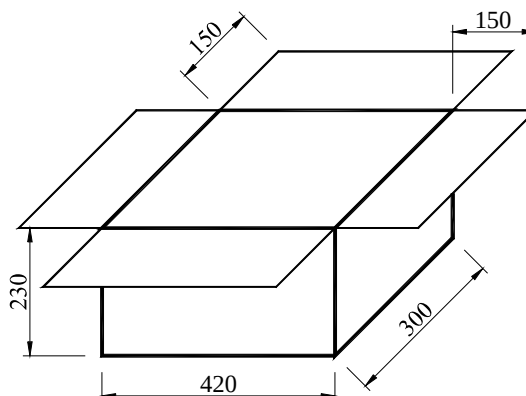
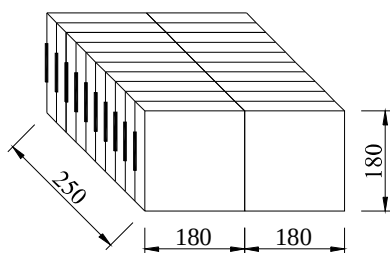
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Carton Dimension (unit : mm)



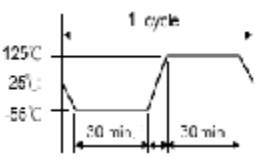
1 reel = 1 Inner box



20 Inner boxes = 1 Carton

60kpcs = 1 Carton

● **RELIABILITY SPECIFICATIONS**

No.	Test Item	Test Conditions	Reference
1	High Temp. Storage	Temp.: 125°C±5°C Time: 1000±12Hrs	MIL-STD-883 Method 108
2	Low Temp. Storage	Temp.: -40°C±5°C Time: 1000±12Hrs	JIS-C7021 B-12
3	Solder Heat Resistance	Pre-heat: 125°C 60~120 Sec. Solder Temp.: 260°C±5°C Time: 30 Sec.	MIL-STD-202 Method 210
4	High Temp., High Humidity Storage	Temp.: 85°C±5°C Relative Humidity: 80%~85% Time: 1000Hrs	MIL-STD-202 Method 103
5	Thermal Shock	Temp.1: -55°C±5°C Temp.2: 125°C±5°C Temp. change: 1min. max. 1000 cycles, maintain T1 and T2 for 30min.max each in one cycle 	JESD22 JA-104
6	Pressure Cooker Storage	121 ± 3°C , RH100% , 2 bar , 240Hrs	EIA-JESD22 A102
7	Drop Test	3 Times Free Fall from 150cm height table to concrete floor	IEC60068-2-32
8	Vibration	Frequency Range: 10Hz~2000Hz Amplitude: 1.52mm or 20G 4Hrs in each direction, total 12Hrs	MIL-STD-202 Method 204
9	Mechanical Shock	Peak value:1000(g's) Normal duration: 0.5mS Waveform : Half-sine shock Pulse:6axis*3times	MIL-STD-202 Method 213
10	Gross Leak	Test Pressure: 2kg /cm ²	MIL-STD-883 Method 1014
11	Fine Leak	Helium Bombing 5kg/cm ² for 2 Hrs	MIL-STD-883 Method 1014
12	Solderability	Dip in flux 5~10 Sec. Temp.: 245°C±5°C Time: 10 Sec.	J-STD-002

Description:E3SB24E00005JE

Reference Fr:24000000 (Using Measured FL)

回流焊试验前

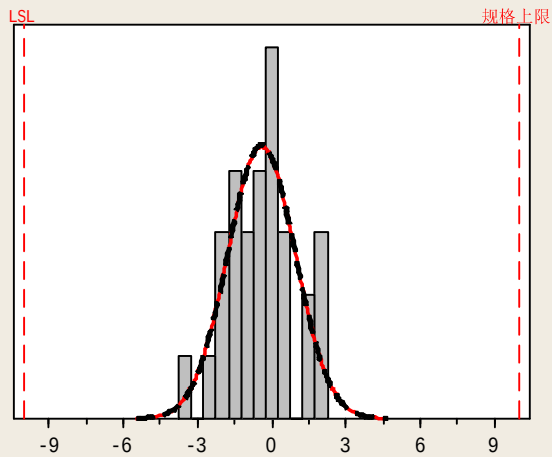
Power: 100.00 uW Into RR

PL: No Load CL: 12.00 pF

Crystal	First Fail.	DLD2 Ohms	RLD2 Ohms	FDLD ppm	FL ppm	RR Ohms	C0 pF	C1 fF	L mH	Q k	TS ppm/pF	SPDB dB
High Limit		10.00	50.00	10.00	10.00	30.00	3.00					
Low Limit					-10.00							
1	PASS	0.38	10.45	3.51	0.05	10.08	0.97	3.04	14.45	216.10	9.05	-9,999.00
2	PASS	0.42	9.74	3.54	-2.13	9.39	0.98	3.09	14.26	228.91	9.16	-9,999.00
3	PASS	0.43	9.29	3.92	-0.46	8.97	0.97	3.06	14.39	241.97	9.09	-9,999.00
4	PASS	0.90	9.56	3.76	-0.14	8.82	0.98	3.06	14.37	245.62	9.09	-9,999.00
5	PASS	0.50	8.59	4.06	-0.26	8.27	0.98	3.05	14.44	263.07	9.05	-9,999.00
6	PASS	0.42	7.69	4.23	-0.16	7.52	0.97	3.06	14.40	288.79	9.08	-9,999.00
7	PASS	0.45	8.77	3.99	0.11	8.49	0.98	3.04	14.45	256.68	9.04	-9,999.00
8	PASS	0.69	8.21	4.21	-3.27	7.83	0.97	3.09	14.23	274.08	9.18	-9,999.00
9	PASS	0.50	7.27	4.59	-2.10	7.04	0.98	3.06	14.36	307.47	9.10	-9,999.00
10	PASS	0.38	10.10	3.38	0.58	9.74	0.98	3.11	14.13	218.57	9.25	-9,999.00
11	PASS	0.67	7.40	4.39	2.04	7.07	0.96	3.10	14.20	302.94	9.22	-9,999.00
12	PASS	0.41	9.23	3.27	-0.50	8.94	0.97	3.11	14.14	238.36	9.24	-9,999.00
13	PASS	0.36	9.36	3.49	-1.60	9.07	0.98	3.11	14.12	234.83	9.24	-9,999.00
14	PASS	0.53	8.60	4.06	-0.88	8.27	0.97	3.11	14.14	257.86	9.25	-9,999.00
15	PASS	0.46	7.94	3.97	-0.82	7.69	0.97	3.13	14.04	275.15	9.32	-9,999.00
16	PASS	0.41	9.52	3.40	-2.10	9.18	0.98	3.07	14.32	235.13	9.11	-9,999.00
17	PASS	0.44	9.65	3.59	1.31	9.26	0.99	3.10	14.19	231.14	9.19	-9,999.00
18	PASS	0.38	10.10	3.36	-0.21	9.76	0.97	3.05	14.42	222.84	9.06	-9,999.00
19	PASS	0.45	11.09	3.15	-1.53	10.69	0.98	3.09	14.25	201.01	9.16	-9,999.00
20	PASS	0.56	8.09	3.75	-0.01	7.80	0.98	3.11	14.15	273.63	9.23	-9,999.00
21	PASS	0.52	9.45	3.55	-0.90	9.05	0.97	3.06	14.38	239.58	9.09	-9,999.00
22	PASS	0.38	9.74	3.39	-1.56	9.43	1.00	3.15	13.95	223.00	9.33	-9,999.00
23	PASS	0.48	13.28	2.59	1.47	12.88	0.97	3.06	14.36	168.10	9.11	-9,999.00
24	PASS	0.52	9.21	3.72	-1.57	8.90	0.97	3.06	14.38	243.72	9.09	-9,999.00
25	PASS	0.79	10.05	3.57	-2.34	9.72	0.98	3.12	14.11	218.85	9.26	-9,999.00
26	PASS	1.23	8.42	3.77	1.83	7.71	0.98	3.08	14.30	279.80	9.12	-9,999.00
27	PASS	0.43	8.76	3.55	0.72	8.47	0.98	3.12	14.09	250.80	9.26	-9,999.00
28	PASS	0.46	8.16	3.84	1.93	7.91	0.97	3.07	14.35	273.57	9.11	-9,999.00
29	PASS	0.45	8.64	3.83	-0.26	8.37	0.96	3.08	14.26	256.91	9.18	-9,999.00
30	PASS	0.43	10.77	2.71	0.39	10.40	0.98	3.14	14.00	203.03	9.33	-9,999.00
MAX		1.23	13.28	4.59	2.04	12.88	1.00	3.15	14.45	307.47	9.33	-9,999.00
MIN		0.36	7.27	2.59	-3.27	7.04	0.96	3.04	13.95	168.10	9.04	-9,999.00
AVER		0.51	9.24	3.67	-0.41	8.89	0.98	3.09	14.25	245.72	9.17	-9,999.00

FL 的过程能力

过程数据	
LSL	-10
望目	*
规格上限	10
样本均值	-0.412735
样本 N	30
标准差 (组内)	1.36238
标准差 (整体)	1.35597



潜在 (组内) 能力	
Cp	2.45
CPL	2.35
CPU	2.55
Cpk	2.35
整体能力	
Pp	2.46
PPL	2.36
PPU	2.56
Ppk	2.36
Cpm	*

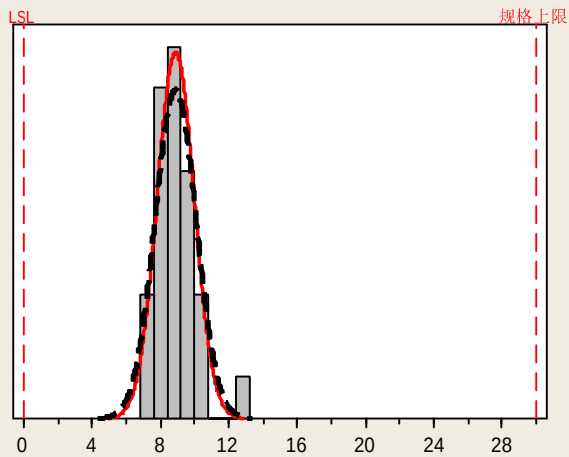
实测性能	
PPM < 规格下限	0.00
PPM > 规格上限	0.00
合计 PPM	0.00

预期组内性能	
PPM < 规格下限	0.00
PPM > 规格上限	0.00
合计 PPM	0.00

预期整体性能	
PPM < 规格下限	0.00
PPM > 规格上限	0.00
合计 PPM	0.00

RR 的过程能力

过程数据	
LSL	0
望目	*
规格上限	30
样本均值	8.89043
样本 N	30
标准差 (组内)	1.08053
标准差 (整体)	1.20274

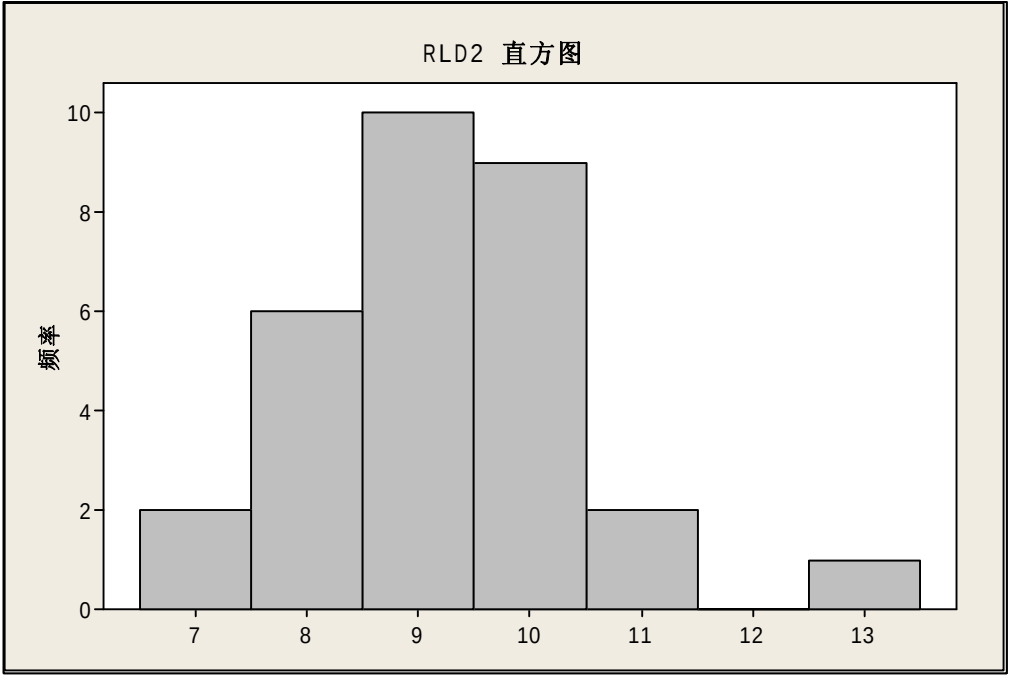
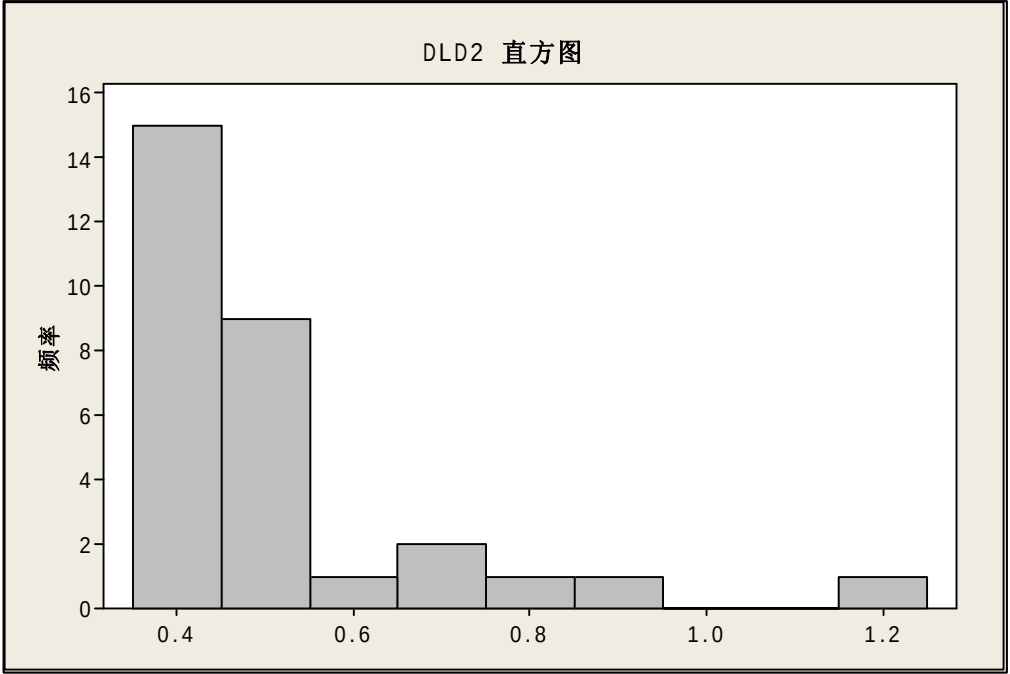


潜在 (组内) 能力	
Cp	4.63
CPL	2.74
CPU	6.51
Cpk	2.74
整体能力	
Pp	4.16
PPL	2.46
PPU	5.85
Ppk	2.46
Cpm	*

实测性能	
PPM < 规格下限	0.00
PPM > 规格上限	0.00
合计 PPM	0.00

预期组内性能	
PPM < 规格下限	0.00
PPM > 规格上限	0.00
合计 PPM	0.00

预期整体性能	
PPM < 规格下限	0.00
PPM > 规格上限	0.00
合计 PPM	0.00



Description:E3SB24E00005JE

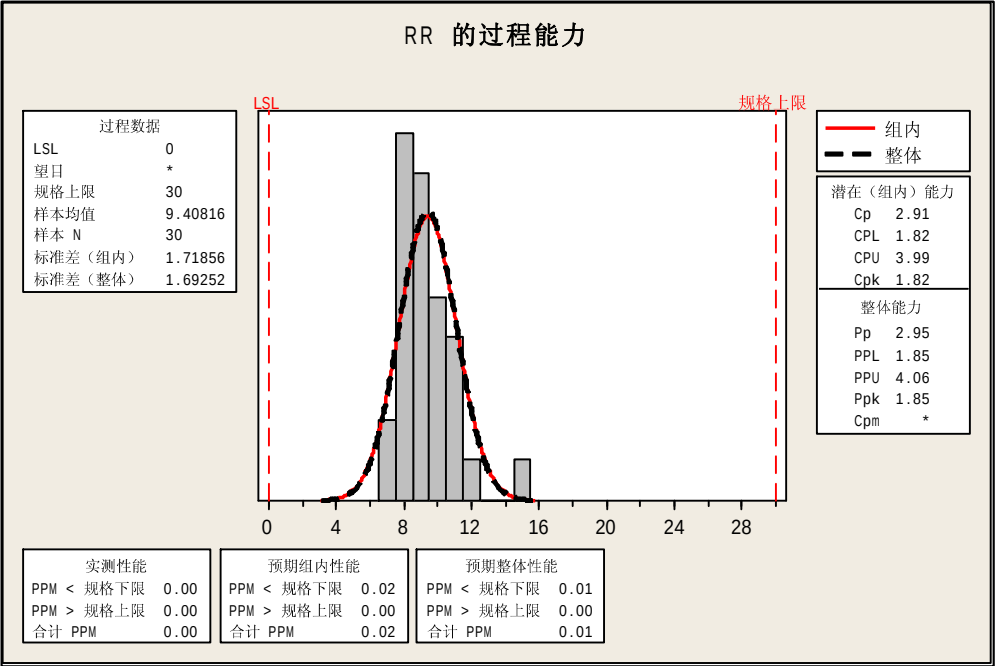
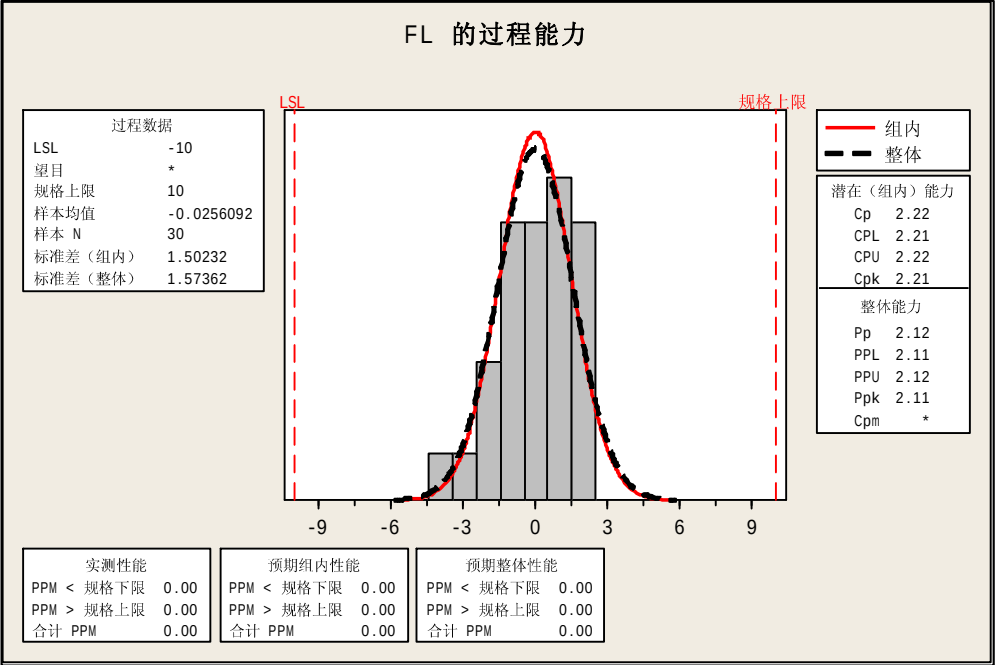
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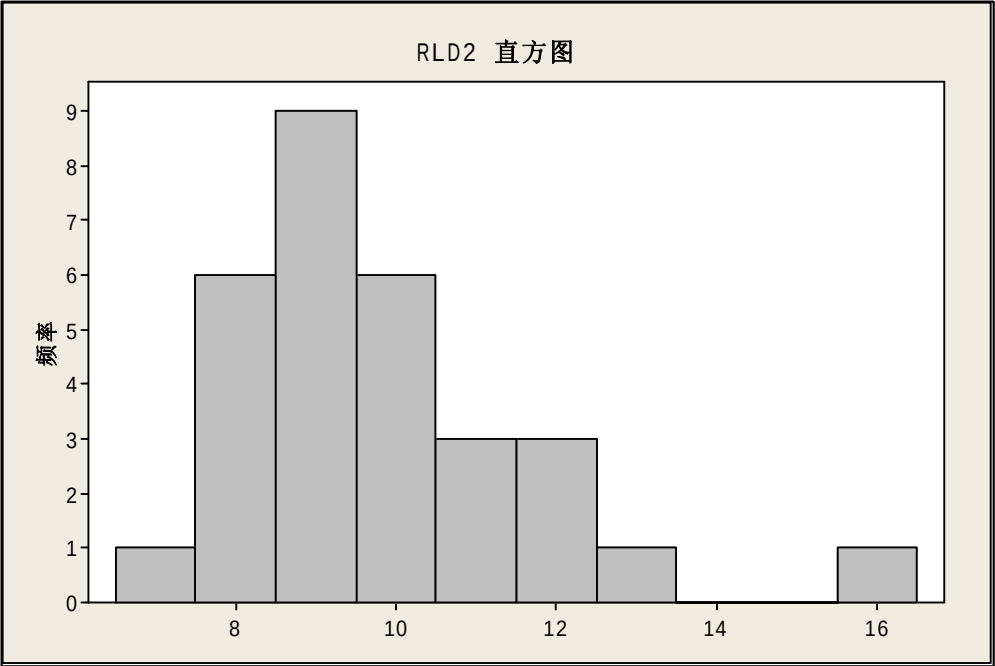
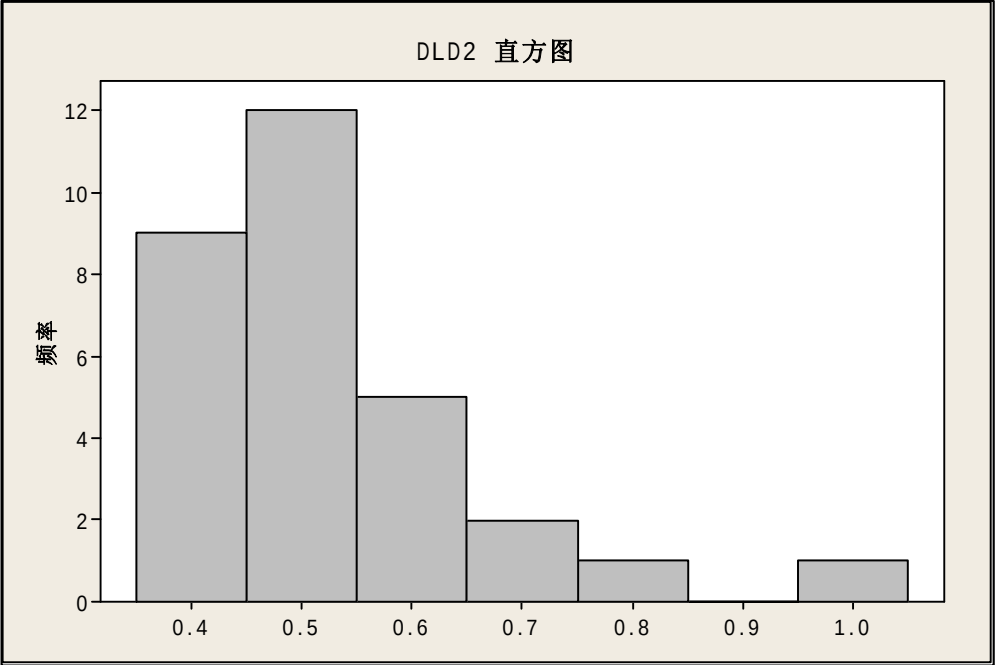
一次回流焊试验后

Power: 100.00 uW Into RR

PL: No Load CL: 12.00 pF

Crystal	First Fail	DLD2	RLD2	FDLD	FL	RR	C0	C1	L	Q	TS	SPDB
		Ohms	Ohms	ppm	ppm	Ohms	pF	fF	mH	k	ppm/pF	dB
High Limit		10.00	50.00	10.00	10.00	30.00	3.00					
Low Limit					-10.00							
1	PASS	0.47	9.56	3.52	-0.42	9.19	0.97	3.11	14.14	231.92	9.25	-9,999.00
2	PASS	0.60	11.86	3.03	1.19	11.33	1.00	3.11	14.12	188.00	9.21	-9,999.00
3	PASS	0.45	9.08	3.71	1.11	8.81	0.98	3.11	14.13	241.96	9.24	-9,999.00
4	PASS	0.35	10.59	3.31	-3.55	10.25	0.96	3.02	14.58	214.46	8.98	-9,999.00
5	PASS	0.64	9.83	3.66	-1.25	9.26	0.98	3.07	14.34	233.45	9.10	-9,999.00
6	PASS	0.47	7.95	3.98	1.67	7.74	0.97	3.07	14.31	278.94	9.13	-9,999.00
7	PASS	0.52	11.44	2.84	2.31	10.97	0.96	3.13	14.05	193.01	9.31	-9,999.00
8	PASS	0.78	10.77	3.08	-2.22	10.19	0.99	3.07	14.32	211.89	9.11	-9,999.00
9	PASS	0.49	8.47	3.80	1.93	8.21	0.98	3.12	14.09	258.85	9.27	-9,999.00
10	PASS	0.46	9.05	3.73	-0.65	8.74	0.98	3.07	14.35	247.70	9.09	-9,999.00
11	PASS	0.35	10.26	2.99	2.01	10.09	0.97	3.13	14.07	210.31	9.29	-9,999.00
12	PASS	0.48	8.42	3.95	-3.02	8.13	0.97	3.09	14.25	264.26	9.18	-9,999.00
13	PASS	0.57	8.70	3.86	-2.15	8.48	0.98	3.11	14.14	251.30	9.23	-9,999.00
14	PASS	0.72	7.43	4.54	-0.96	7.04	0.98	3.11	14.13	302.84	9.23	-9,999.00
15	PASS	0.44	8.62	3.95	-1.22	8.34	0.97	3.03	14.51	262.34	9.01	-9,999.00
16	PASS	0.38	9.64	3.10	0.70	9.36	0.97	3.10	14.21	228.83	9.20	-9,999.00
17	PASS	0.49	11.95	3.08	0.40	11.45	0.97	3.09	14.25	187.69	9.17	-9,999.00
18	PASS	1.00	8.20	4.23	-1.14	7.46	0.99	3.13	14.06	284.33	9.28	-9,999.00
19	PASS	0.45	9.05	3.78	-1.24	8.92	1.00	3.09	14.22	240.39	9.16	-9,999.00
20	PASS	0.46	8.89	3.65	0.16	8.58	0.98	3.13	14.07	247.40	9.28	-9,999.00
21	PASS	0.41	8.17	4.30	0.26	7.95	0.97	3.06	14.40	273.01	9.08	-9,999.00
22	PASS	0.45	8.61	3.97	-0.30	8.33	0.96	3.03	14.52	262.78	9.01	-9,999.00
23	PASS	0.36	10.34	3.31	1.91	9.96	0.98	3.13	14.07	212.98	9.28	-9,999.00
24	PASS	0.67	9.34	3.71	1.78	8.87	0.97	3.12	14.08	239.41	9.28	-9,999.00
25	PASS	0.43	10.28	3.16	0.68	9.89	0.97	3.06	14.36	218.80	9.10	-9,999.00
26	PASS	0.48	8.08	3.87	1.16	7.87	0.97	3.08	14.30	273.97	9.15	-9,999.00
27	PASS	0.63	12.85	3.06	0.76	12.18	0.99	3.04	14.47	179.22	9.00	-9,999.00
28	PASS	0.49	8.57	3.78	0.41	8.26	0.97	3.11	14.16	258.56	9.23	-9,999.00
29	PASS	0.65	15.81	2.23	-1.91	15.14	0.98	3.08	14.27	142.10	9.14	-9,999.00
30	PASS	0.45	11.68	3.08	0.82	11.29	0.98	3.07	14.32	191.36	9.11	-9,999.00
MAX		1.00	15.81	4.54	2.31	15.14	1.00	3.13	14.58	302.84	9.31	-9,999.00
MIN		0.35	7.43	2.23	-3.55	7.04	0.96	3.02	14.05	142.10	8.98	-9,999.00
AVER		0.52	9.78	3.54	-0.03	9.41	0.98	3.09	14.24	234.40	9.17	-9,999.00





Description:E3SB24E00005JE

Reference Fr:24000000 (Using Measured FL)

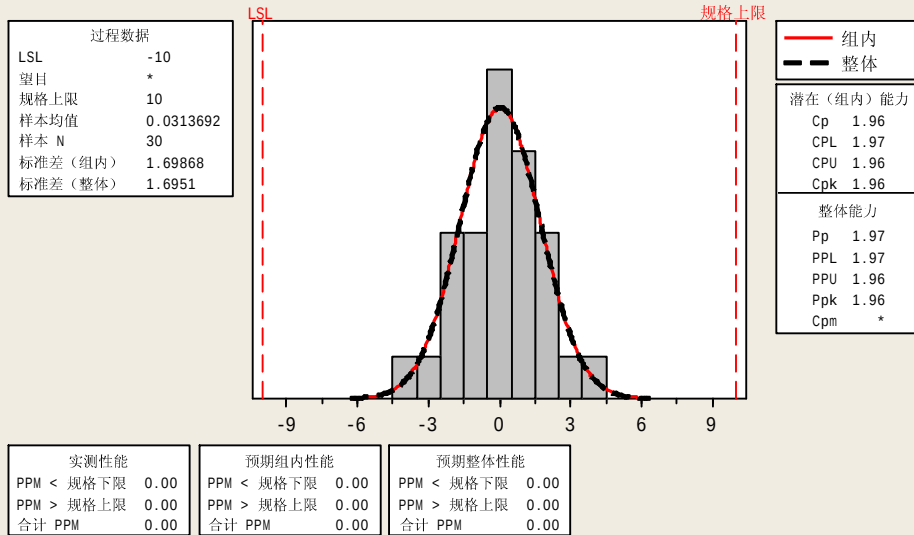
二次回流焊试验后

Power: 100.00 uW Into RR

PL: No Load CL: 12.00 pF

Crystal	First Fail	DLD2 Ohms	RLD2 Ohms	FDLD ppm	FL ppm	RR Ohms	C0 pF	C1 fF	L mH	Q k	TS ppm/pF	SPDB dB
High Limit		10.00	50.00	10.00	10.00	30.00	3.00					
Low Limit					-10.00							
1	PASS	0.39	9.82	3.40	-1.72	9.50	0.98	3.08	14.29	226.74	9.14	-9,999.00
2	PASS	0.47	7.65	4.33	0.82	7.43	0.98	3.11	14.13	286.73	9.24	-9,999.00
3	PASS	0.40	12.06	2.95	-2.00	11.66	0.98	3.07	14.34	185.43	9.11	-9,999.00
4	PASS	0.88	11.40	3.06	2.07	10.83	0.97	3.11	14.13	196.77	9.25	-9,999.00
5	PASS	0.43	7.49	4.27	-0.17	7.31	0.96	3.09	14.24	293.68	9.20	-9,999.00
6	PASS	0.42	9.07	3.89	1.59	8.64	0.96	3.08	14.29	249.16	9.16	-9,999.00
7	PASS	0.38	10.04	3.62	-0.44	9.70	0.97	3.05	14.44	224.48	9.05	-9,999.00
8	PASS	0.46	8.64	3.74	-0.67	8.33	0.97	3.10	14.17	256.49	9.23	-9,999.00
9	PASS	0.37	9.87	3.30	-3.68	9.54	0.98	3.12	14.09	222.56	9.27	-9,999.00
10	PASS	0.47	8.62	3.84	-1.24	8.34	0.98	3.06	14.39	260.13	9.08	-9,999.00
11	PASS	0.65	7.06	4.81	-0.99	6.71	0.97	3.07	14.31	321.40	9.13	-9,999.00
12	PASS	0.65	12.95	2.80	0.42	12.55	0.98	3.05	14.44	173.43	9.04	-9,999.00
13	PASS	0.75	9.68	3.12	3.66	9.07	0.97	3.12	14.10	234.49	9.27	-9,999.00
14	PASS	1.21	8.92	4.05	-0.65	8.12	0.99	3.13	14.06	261.18	9.27	-9,999.00
15	PASS	0.71	8.23	3.92	-2.30	7.75	0.98	3.12	14.11	274.41	9.26	-9,999.00
16	PASS	0.52	8.00	4.23	-3.10	7.70	0.98	3.03	14.51	283.97	9.00	-9,999.00
17	PASS	0.44	7.77	4.37	1.40	7.55	0.97	3.05	14.44	288.48	9.05	-9,999.00
18	PASS	0.42	10.44	3.44	-0.36	10.09	0.96	3.08	14.28	213.54	9.16	-9,999.00
19	PASS	0.57	7.60	4.61	2.93	7.25	0.98	3.09	14.23	296.11	9.17	-9,999.00
20	PASS	0.63	7.84	4.33	0.80	7.61	0.96	3.04	14.48	286.96	9.04	-9,999.00
21	PASS	0.43	9.01	3.79	0.42	8.70	0.98	3.07	14.33	248.39	9.11	-9,999.00
22	PASS	0.50	6.96	4.39	2.16	6.77	0.96	3.12	14.09	313.75	9.29	-9,999.00
23	PASS	0.45	11.78	2.84	0.68	11.38	0.97	3.11	14.16	187.61	9.23	-9,999.00
24	PASS	0.45	8.57	3.84	1.51	8.28	0.96	3.10	14.17	258.15	9.23	-9,999.00
25	PASS	0.46	8.62	3.94	0.22	8.33	0.97	3.09	14.25	258.08	9.18	-9,999.00
26	PASS	0.44	11.05	2.67	0.20	10.63	0.97	3.14	14.00	198.55	9.34	-9,999.00
27	PASS	0.77	9.92	3.50	0.57	9.44	0.97	3.05	14.41	230.14	9.07	-9,999.00
28	PASS	0.65	9.52	3.23	-0.09	8.68	0.98	3.11	14.14	245.49	9.24	-9,999.00
29	PASS	1.72	12.09	2.72	-1.84	11.02	0.98	3.07	14.32	195.99	9.12	-9,999.00
30	PASS	0.46	10.87	3.02	0.73	10.53	0.97	3.11	14.14	202.46	9.24	-9,999.00
MAX		1.72	12.95	4.81	3.66	12.55	0.99	3.14	14.51	321.40	9.34	-9,999.00
MIN		0.37	6.96	2.67	-3.68	6.71	0.96	3.03	14.00	173.43	9.00	-9,999.00
AVER		0.58	9.38	3.67	0.03	8.98	0.97	3.09	14.25	245.82	9.17	-9,999.00

FL 的过程能力



RR 的过程能力

