

# TOSHIBA

Leading Innovation >>>

## TOSHIBA Input Couplers - Copper Plating -

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Representing Toshiba's  
environmental commitment

- **Toshiba Product Line Up**
- **Copper Plating in TETD for Electron Tubes**
- **Some information**

# Product lines



型式 Type	周波数(MHz) Frequency	入力電力 Input Power	CW/PULSE	フランジ /Flange		冷却 Cooling	質量(kg) Weight	全長(mm) Length
				入力 Input	出力 Output			
<b>COUPLERS</b>								
E4277	324	400kW	620 $\mu$ s	WX-152D	ICF203	L	60	1,230
E4294	324	400kW	620 $\mu$ s	WX-152D	WX-77D	L	70	819
■E4251	500.1	150kW	CW	WR1,500	ICF203	L,FA	40	482
E4262	500.1	300kW	CW	WR1,500	ICF203	L,FA	50	708
E4261	508.6	300kW	CW	WR1,500	ICF203	L,FA	50	903
E4263	508.6	300kW	CW	WR1,500	ICF203	L,FA	50	990
E4268	508.9	800kW	CW	WR1,500	ICF203	L,FA	50	703
E42107	508.9	800kW	CW	WR1,500	ICF203	L,FA	55	765
E4274	508.9	40kW	CW	ICF203	WX-120D	L	30	820
E4253	714.0	50kW	CW	WR1,500	ICF152	L,FA	40	650
E42109	1,300	20kW	CW	WR650	coaxial	–	25	750
E42111	1,300	300kW	CW	WR650	coaxial	L,FA	13	603
E42100*	1,300	1MW/500kW	400 $\mu$ s/1.3msec	WR650	coaxial	–	25	730
E42101*	1,300	1MW	1.5msec	WR650	coaxial	–	25	750
E42102*	1,300	1MW	1.5msec	WR650	coaxial	–	25	730
<b>WIND OWS</b>								
E4271	508.6	350kW	CW	152D coaxial	152D coaxial	L	15	377
E4278	805.0	550kW	1.3msec	coaxial	coaxial	FA	10	408
E4279	972.0	350kW	1.3msec	WX-120D	WX-120D	FA	8	153
E4264	2,450.0	5kW	CW	WR430	WR430	L	8	68
E4295	2,856.0	5MW	15 $\mu$ s	UG-53/U	UG-53/U	L	10	305
E4258	2,856.0	40MW	4 $\mu$ s	WR284	WR284	L	10	321
VT-68423	5,712.0	25MW	2.5 $\mu$ s	WR187	WR187	–	6	204
VT-68423,A	5,712.0	7MW	4 $\mu$ s	WR187	WR187	L	6	204

■ Super  
■ Normal

# Contents



cold part

**E42101**  
750mm



warm part



**E42111**  
688mm



cold part  
**E42109**  
266mm



**E4278**  
408mm



**E4268**  
703mm



**E4262**  
708mm



**E4277**  
1,230mm



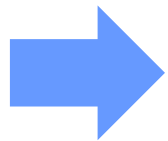
**E4294**  
819mm

- **Cyanide Copper (CuCN)**

[merit] - good / strong electro deposition  
- fulfill established for a long years in the electron tube field  
- very stable process

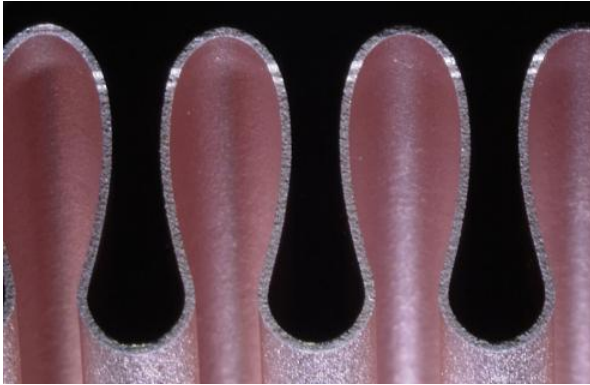
[demerit] - hazardous substance  
- poor mirror surface

[importance] - surface clean, disposal the grease  
- control the solution and V/A



**Toshiba's standard process in the Electron Tubes**

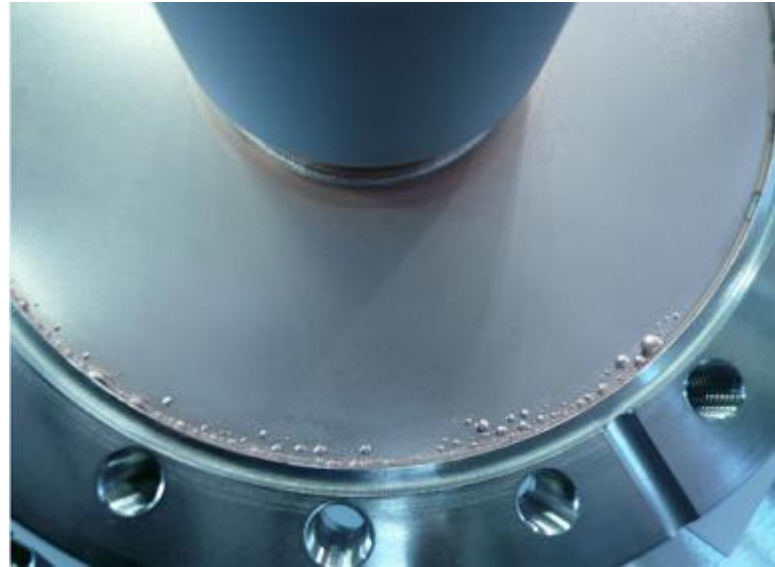
# Some photoes for Copper Plating



30um

# Some troubles

- **Blisters**



**There's no trouble like this for more than several years in TETD.**

## Copper Plating Process and Control Method ( Example )

\* Example of  
Syanide copper  
plating in (TETD)

Process chart	Process Name	Control Item	Control Method
	Cyanide electrolysis	Liquid density Liquid temperature Voltage Time	Density gauge Temperature gauge Voltmeter Hour meter
	Water washing (1)	Flow rate	Visual check
	Water washing (2)	Flow rate	Visual check
	Dipping into hydrochloric acid	Liquid concentration Time	Periodical replacement
	Water washing (3)	Flow rate	Visual check
	Copper plating	Liquid composition  pH Liquid temperature Voltage Time	Simplified analyzer Periodical replacement pH-test paper Temperature gauge Voltmeter Hour meter
	Water washing (4)	Purity	Periodical replacement
	Water washing (5)	Conductivity Flow rate	Conductivity meter Visual check
	Washing with hot pure water	Liquid temperature Time	Temperature gauge Hour meter
	Air blow	Pressure	Pressure gauge
	Hot-air drying	Temperature Time	Temperature gauge Hour meter



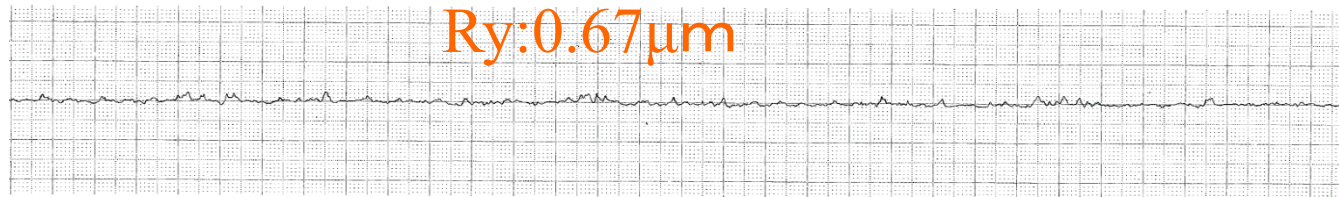
# For Super and RRR

[Cyanide Copper (CuCN)]

- RRR After HT is low value → only for normal

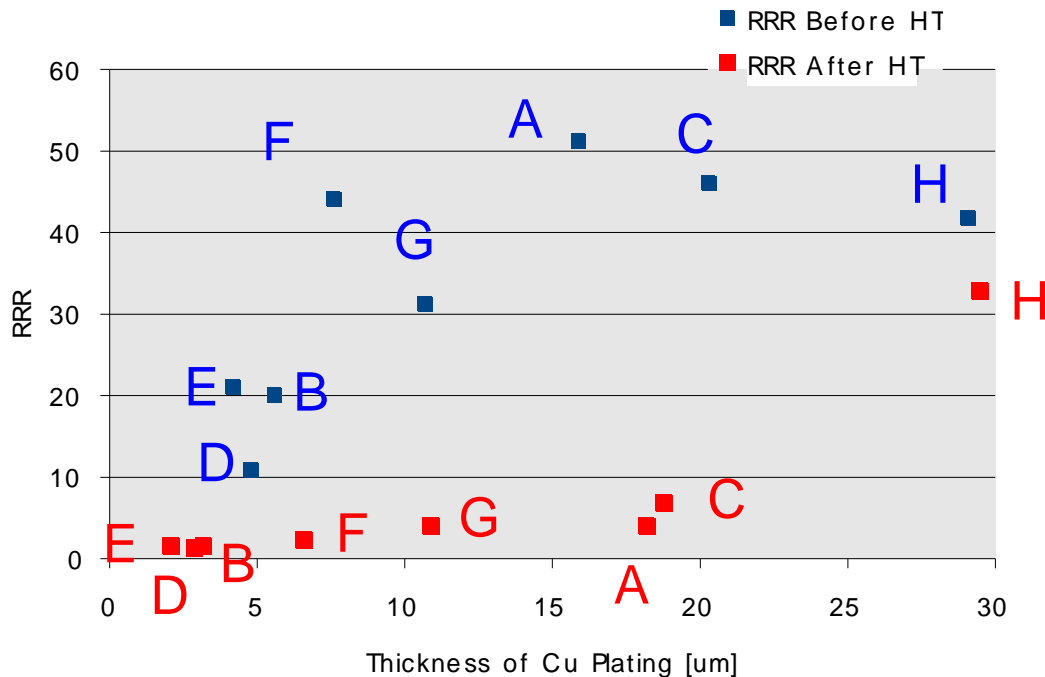
[Copper pyrophosphate ]

- for super → Pyrophosphate Copper Plating



# RRR : some reports (Tokyo Denkai @ LCWS2014)

Before HT	After HT	Vender	Thickness of Cu Plating	Plating Method
A1,2,3	A4,5,6	A	Au Strike + Cu 5.2 um	pyrophosphate
B1,2,3	B4,5,6	A	Au Strike + Cu 19.2 um	pyrophosphate
C1,2,3	C4,5,6	A	Ni Strike + Cu 5.4 um	pyrophosphate
D1,2,3	D4,5,6	A	Ni Strike + Cu 20.6 um	pyrophosphate
E1,2,3	E4,5,6	B	Ni Strike + Cu 5 um	Cyanide
F1,2,3	F4,5,6	B	Ni Strike + Cu 20 um	Cyanide
G1,2,3	G4,5,6	C	Ni Strike + Cu 11.7 um	Cyanide



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