

# TOSHIBA

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## Comparison of fabrication techniques in TTF3/STF2 couplers

Scope of Disclosure	
Owner	

Toshiba Electron Tubes & Devices Co., Ltd.  
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Toshiba Group contributes to  
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# Introduction

I'd like to share with you comparison between two types of coupler about manufacturing.

- TETD has plenty of experience with STF2 type coupler.
- TETD also has some experience in producing TTF3 type coupler.



STF2 type Couplers

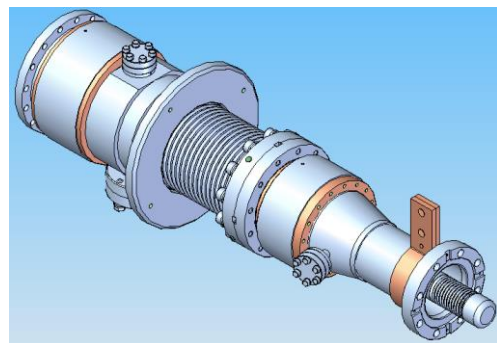
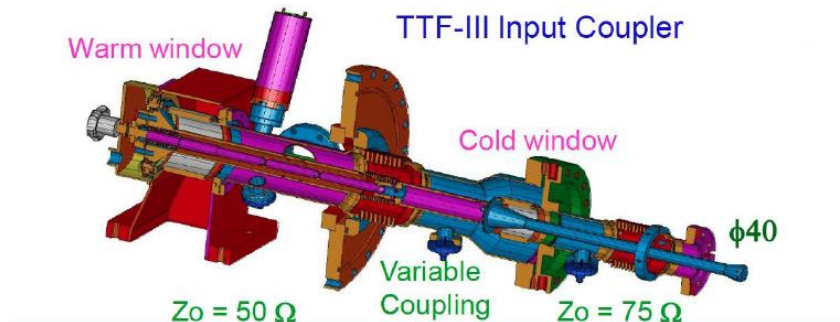


TTF-III type Couplers

# What we will compare between two couplers

## Coaxial assemblies and Window assemblies

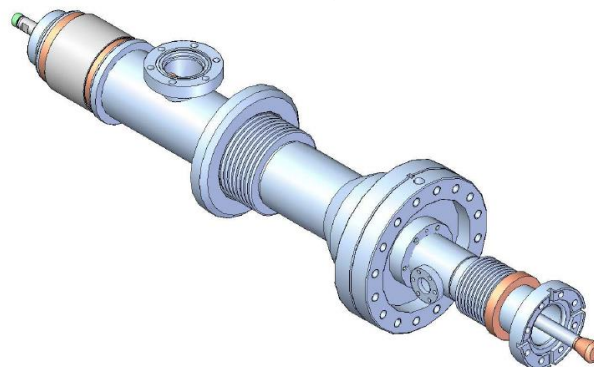
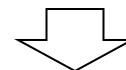
Because TETD does not produce a rectangular wave guide and a door knob in STF2 couplers.



Windows and Coaxial parts of STF2 type Coupler

↔  
To compare

TTF-III type Coupler



Windows and Coaxial parts of TTF-III type Coupler

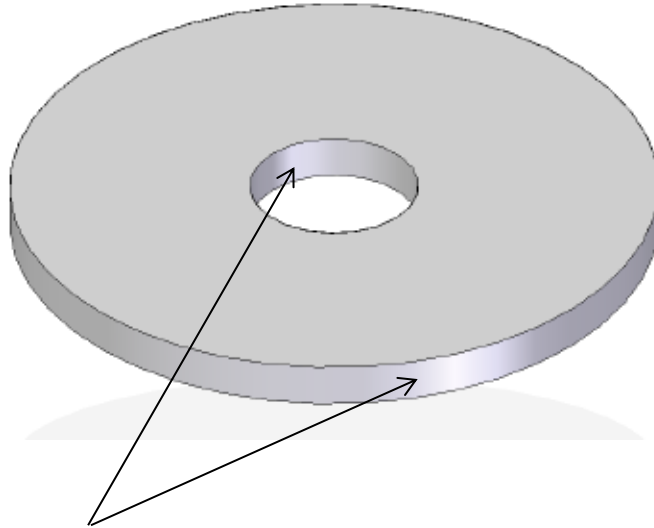
# Comparison table: TTF3, TTF3 by TETD, STF2

	TTF-III	TTF-III TETD version	STF2	Remarks
Warm Window Ceramic	Cylindrical (with V-shaped groove)	Cylindrical (with V-shaped groove)	Disk	
Cold Window Ceramic	Cylindrical (with V-shaped groove)	Cylindrical (with V-shaped groove)	Disk	
Ceramic Purity	97.6%	97.6%	95%	
Number of parts *	37	33	49	
Brazing Type	Vacuum	Vacuum	Hydrogen	
EBW points *	4	0	0	
Number of Processes	20	20	21	exclude final assembly and Inspection
Brazing *	6	11	12	
EB Welding	2	0	0	
TiG Welding	5	2	2	
TiN coating	3	3	3	
Copper Plating	3	4	4	
Vacuum Treatment	more than 4	some	0	
Materials *	* SUS316LN/316L/ 304L/304	* SUS316LN/316L/ 304L/304	* SUS316L/304L/ 304 (no 316LN)	
	Cu OFE	Cu OFE	Cu OFE	

\* Excluding Waveguide, Capacitor, Adjusting mechanism and Support brackets

# Window ceramics: Disk or Cylindrical

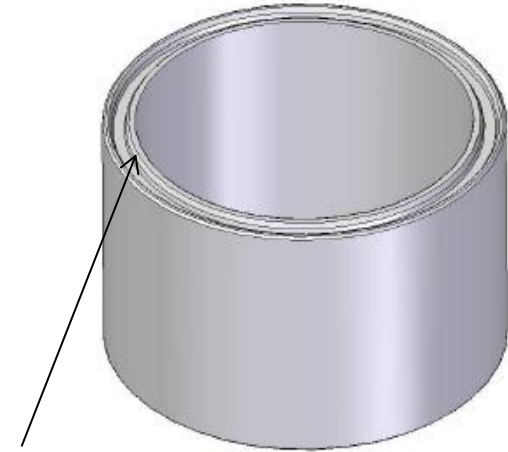
STF2 type Couplers



Metalized surface

Proven and trusted structure by developing klystrons and couplers in KEK

TTF-III type Couplers



Metalized surface

Double V-shaped groove

Only so many ceramics makers can supply this structure.

# Summary

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## 1. Advantage of brazing in mass production

- To reduce joining and parts numbers
- To make batch processing easy

## 2. Advantage of disk windows

- Simple structure of metalized surface
- Proven and trusted structure by developing klystrons and couplers in KEK
- Easier to coat TiN

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