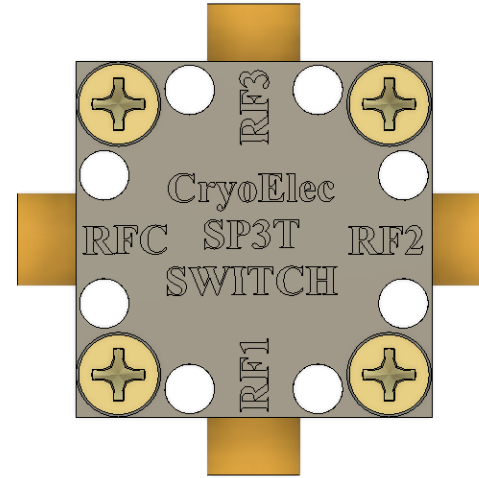
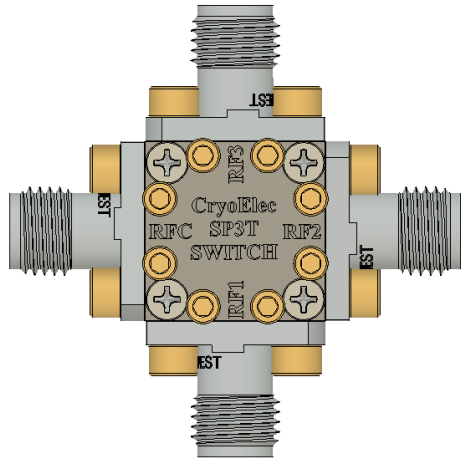


CryoElec SP3T-SMPM CryoSwitch

07/2023



SP3T-SMPM SN#26

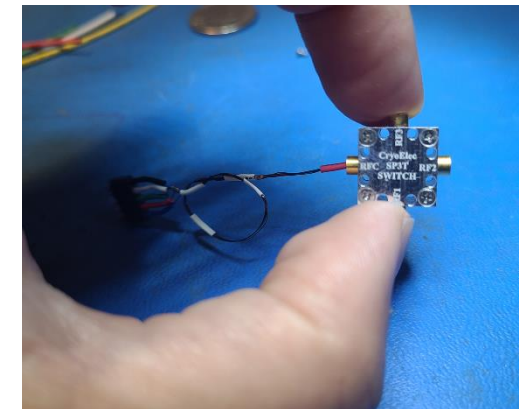


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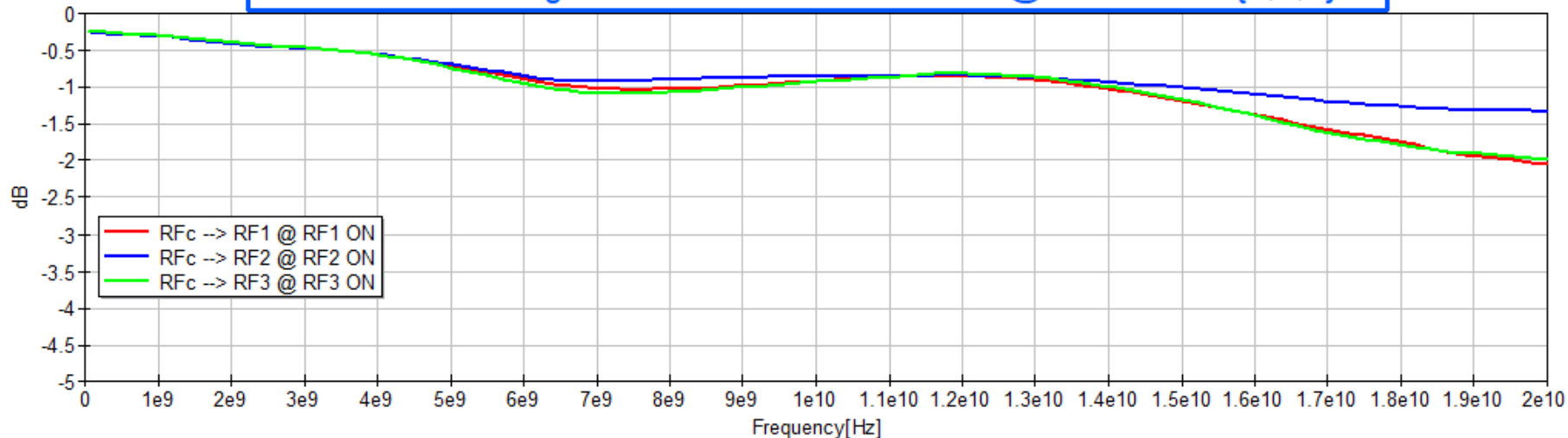
Email: info@CryoElec.com hamdi.mani@gmail.com

Web: www.CryoElec.com

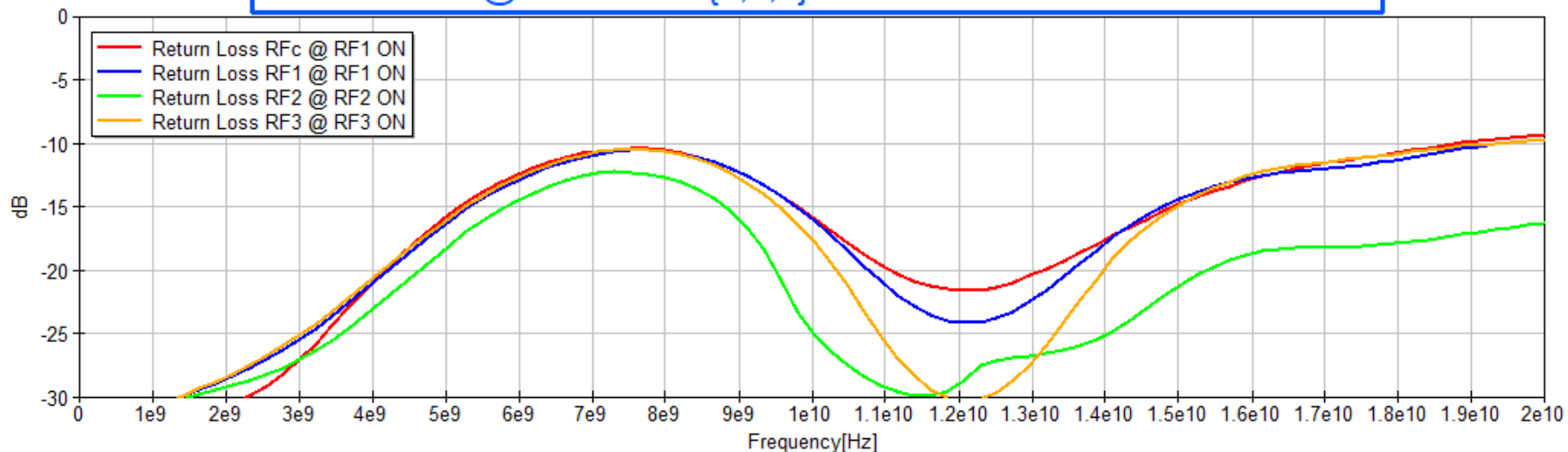


SP3T CryoSwitch: Insertion & Return Loss @ 300 Kelvin

CryoElec SP3T CryoSwitch SN#26 Insertion Loss @ 300 Kelvin
 Transmission through 3 Channels: RFc --> RFn @RFn ON n={1,2,3}

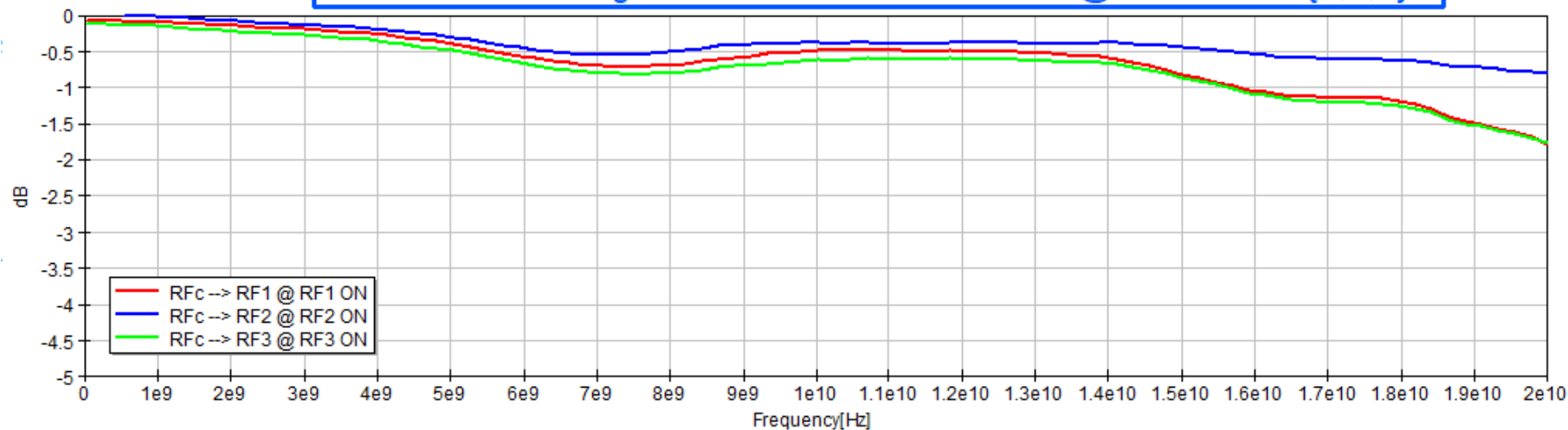


CryoElec SP3T CryoSwitch SN#26 Return Loss @ 300 Kelvin
 Return Loss @RFn ON n={1,2,3}

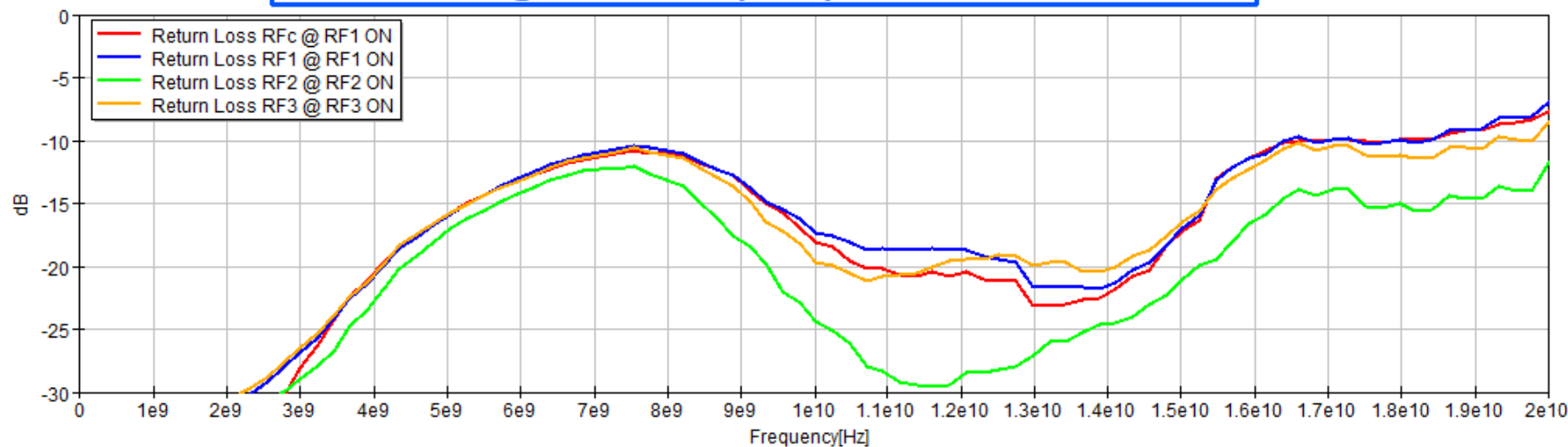


SP3T CryoSwitch: Insertion & Return Loss @ 15 Kelvin

CryoElec SP3T CryoSwitch SN#26 Insertion Loss @ 15 Kelvin
 Transmission through 3 Channels: RFc --> RFn @RFn ON n={1,2,3}

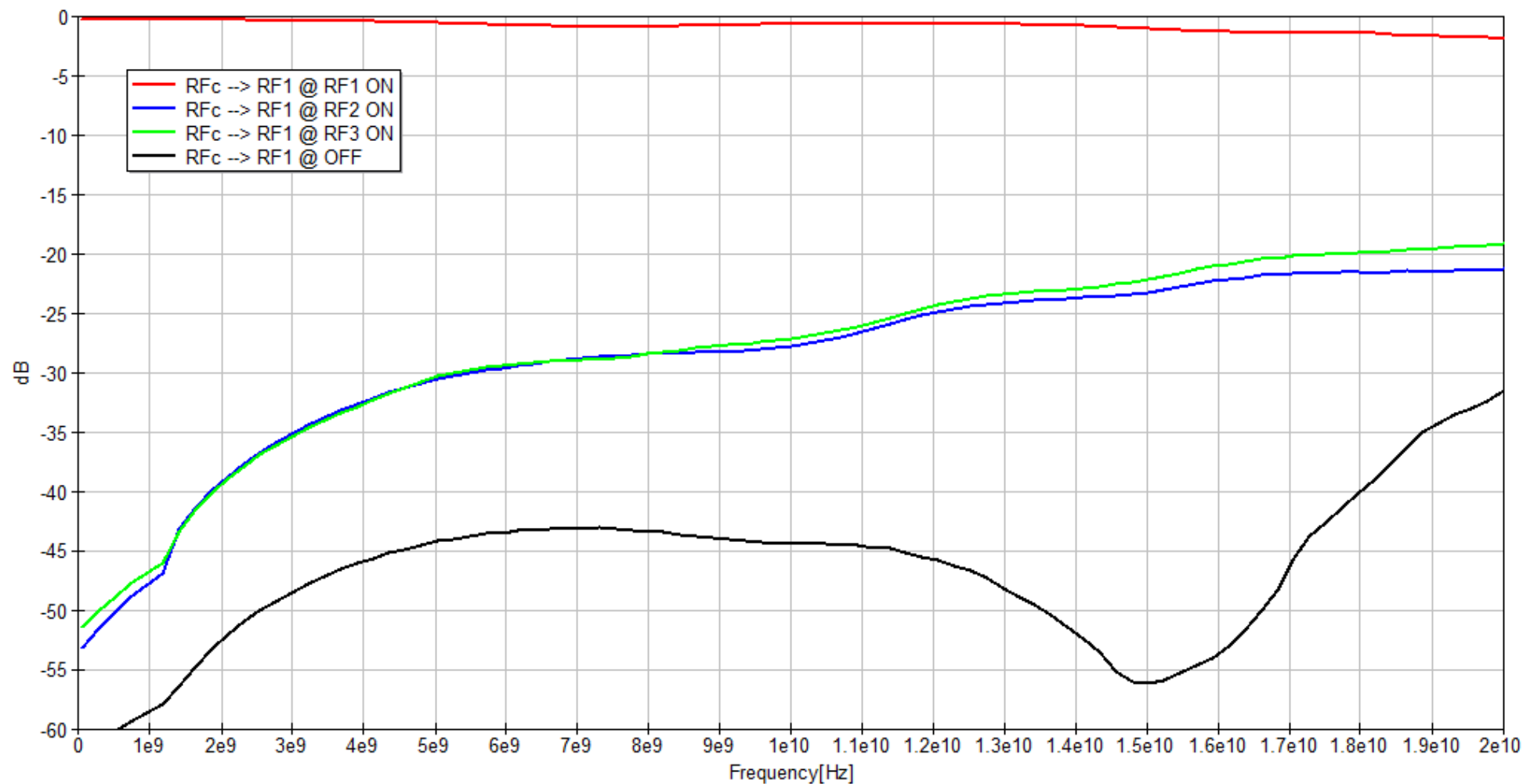


CryoElec SP3T CryoSwitch SN#26 Return Loss @ 15 Kelvin
 Return Loss @RFn ON n={1,2,3}



SP3T CryoSwitch: Insertion Loss and Isolation @ 15 Kelvin

CryoElec SP3T CryoSwitch SN#26 Insertion Loss @ 15 Kelvin
Transmission: RFc --> RF1 @ RFn ON n={1,2,3}

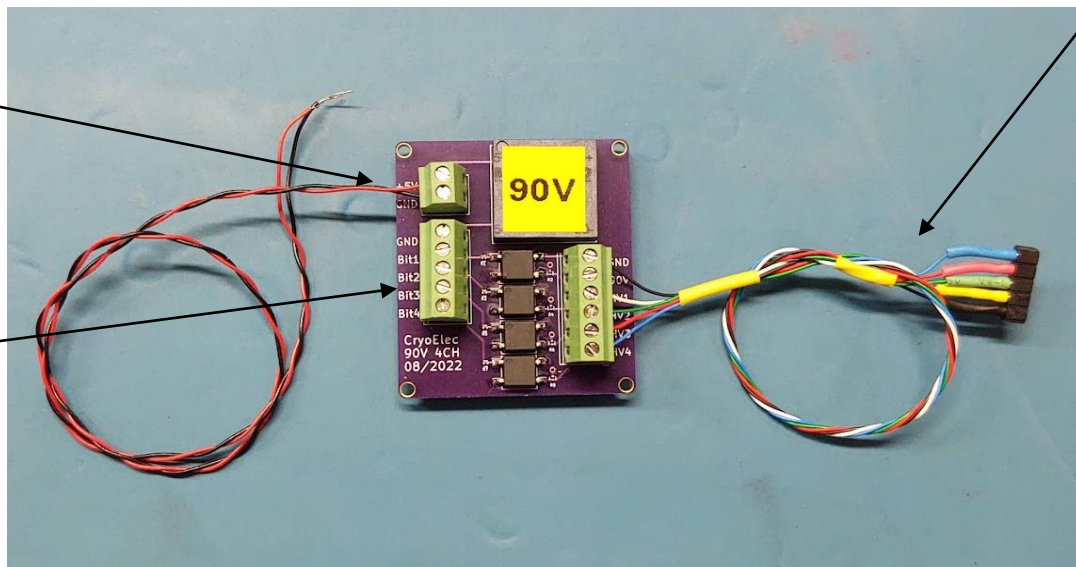


SP3T CryoSwitch: 90V Control Board and Truth Table

+5V TO +90V Switch Control Board

+5V DC Input
(@ 150mA)

Digital Control Bits:
Connect To digital
Outputs (5V TTL) of
A DAQ (Labjack ,
Arduino,Rpi...)



90V output lines:
Connect to Switch
GND, VG1 to VG4

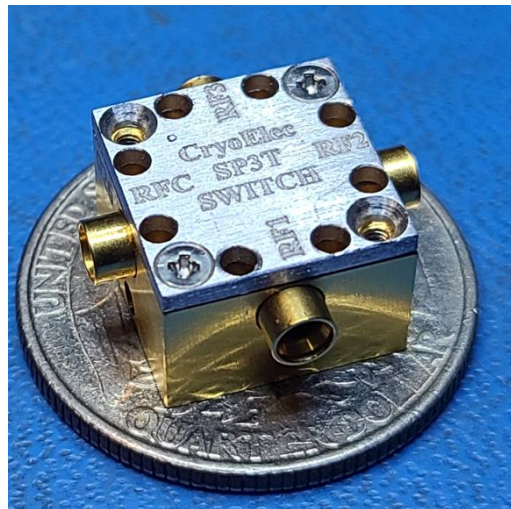
- HVn Enable/Turned “ON” when Bitn “HIGH” (3.3V -5V) n={1,2,3}
- Current drawn by each 90V HV line connected to Switch < 10nA
- “OFF” state: 0V: connects to GND (do not Float)
- HV Channels optically isolated from digital control Bits
- Current drawn by controller:
 - 43mA @ 5V (All Channels OFF)
 - 50mA @ 5V (ONE Channel ON – 2x 90V gates ON)
- Recommended: Set compliance current (Max Current) to 150mA for 5V supply

CryoElec SP3T Switch Truth Table						
Controller Input Wire		Controller Output Wire		RFc-->RF1	RFc-->RF2	RFc-->RF3
Wire Color	Function	Wire Color	Function			
White	Cbit1	White	VG1	1	1	1
Green	Cbit2	Green	VG2	1	0	0
Red	Cbit3	Red	VG3	0	1	0
Blue	Cbit4	Blue	VG4	0	0	1
Black	GND	Black	GND			

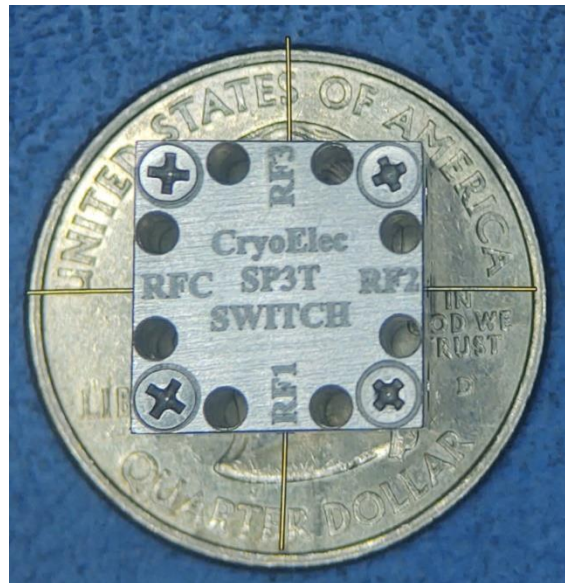
Logic 1 90V Applied Voltage

SP3T CryoSwitch: Photos of Package

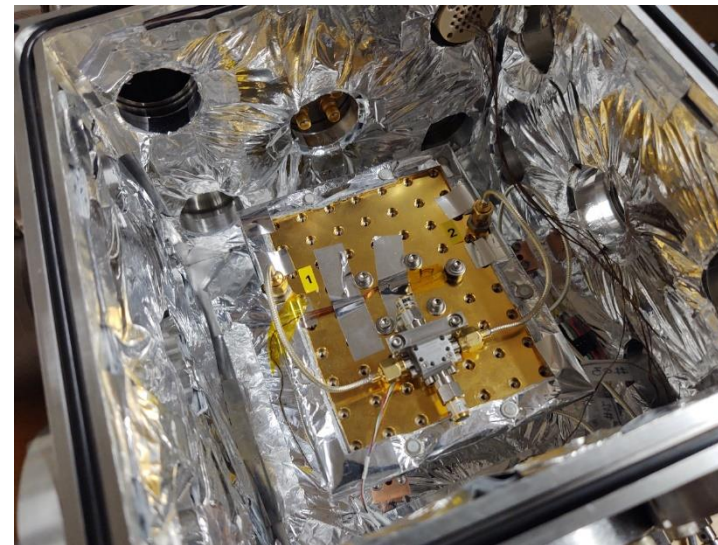
Prototype



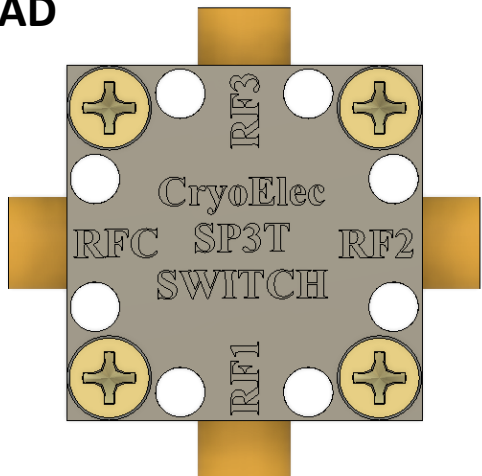
“Drop-in” Package
 Can be soldered to PCBs



Inside the 15K Cryogenic system
 At CryoElec LLC Arizona

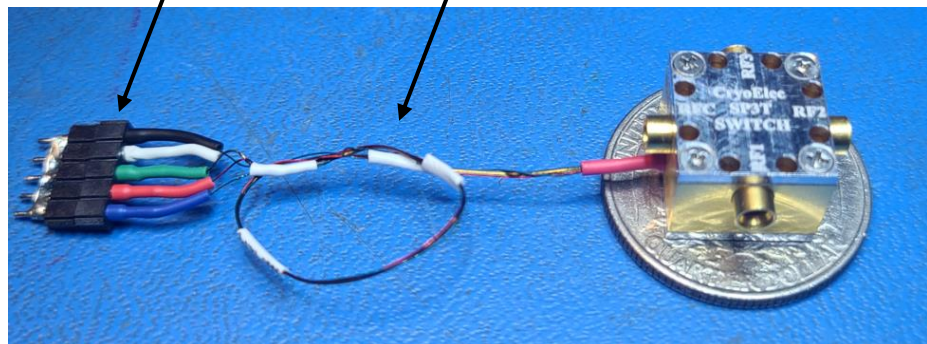


CAD



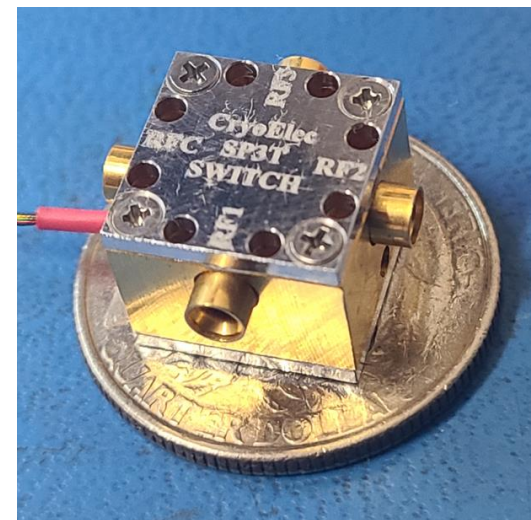
5 pin Socket
 2mm Pitch

5 Wire 36 AWG
 Cryo Wire

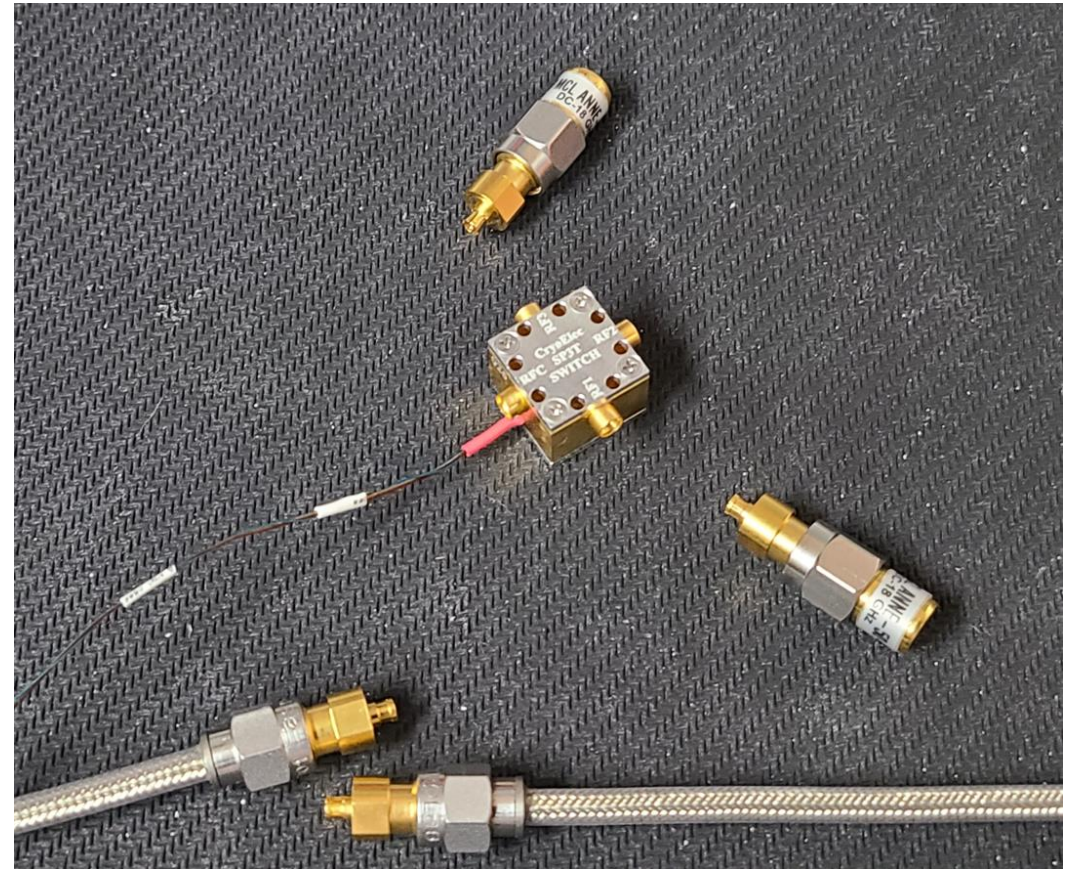
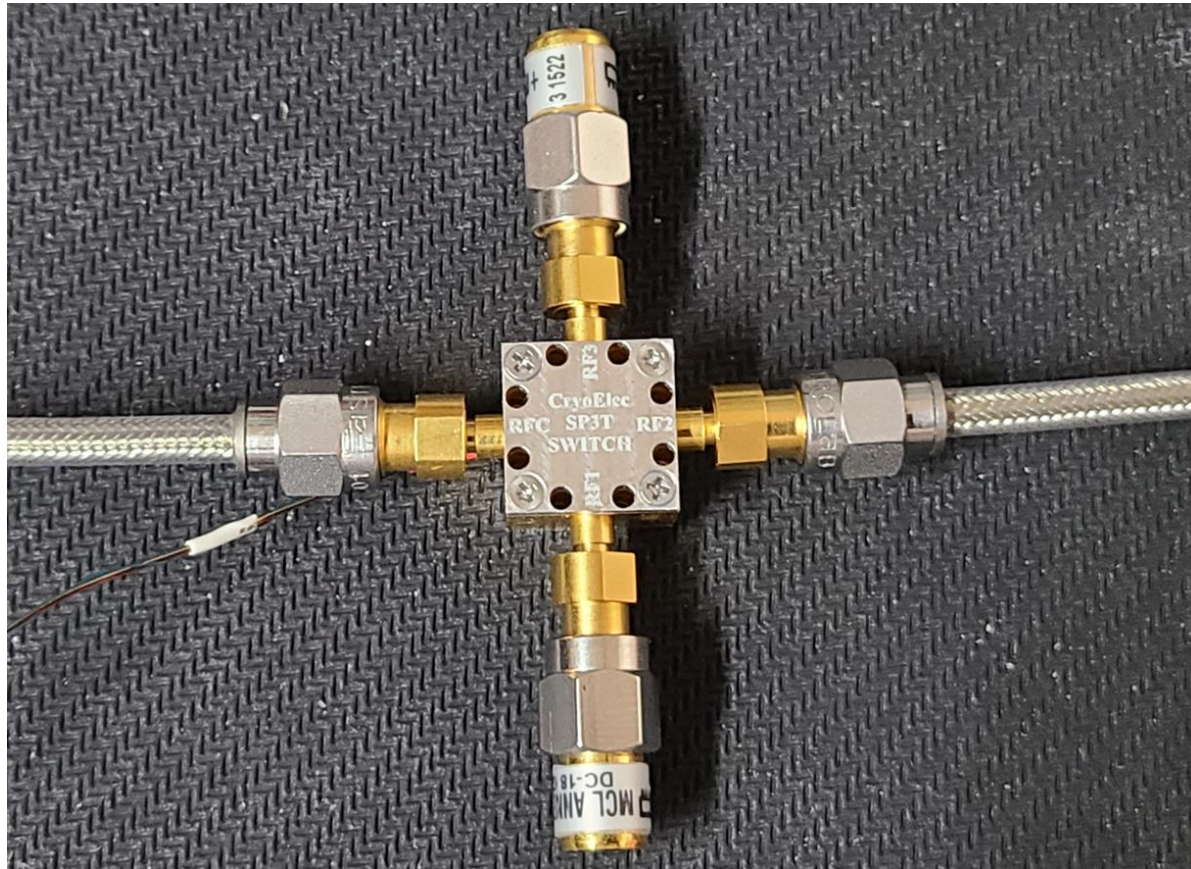


Low Loss SP3T Miniature Cryogenic Switch
Size: 0.5 x 0.5 x 0.4 in

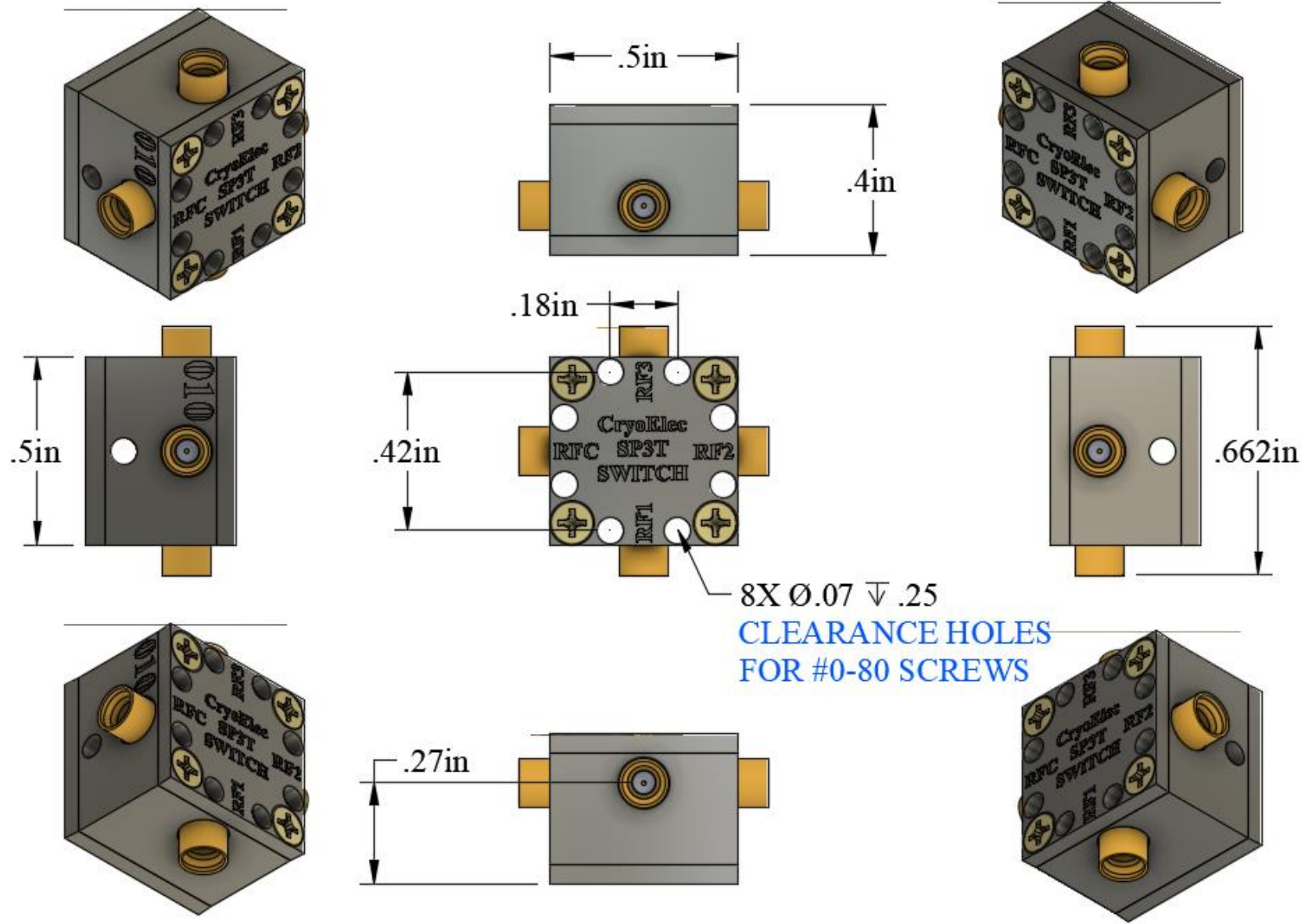
Many Switch units cooled many times to 13K
 Some units cooled to 50mK
 Works reliably / Repeatable performance
 Very Low Loss
 Very low power dissipation (<1uW)
 The 3 paths are symmetric (have same loss/electrical length)



SP3T CryoSwitch: SMA-SMPM adapter used for Connecting to Test Equipment



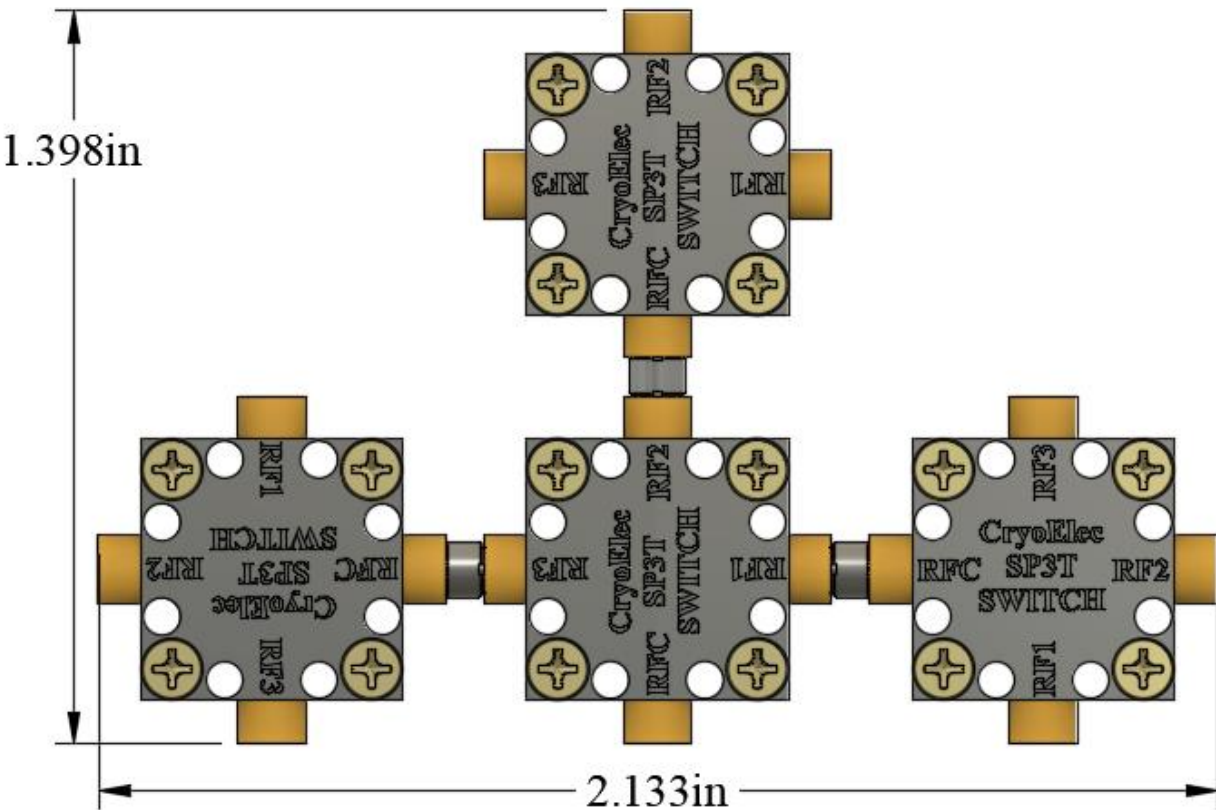
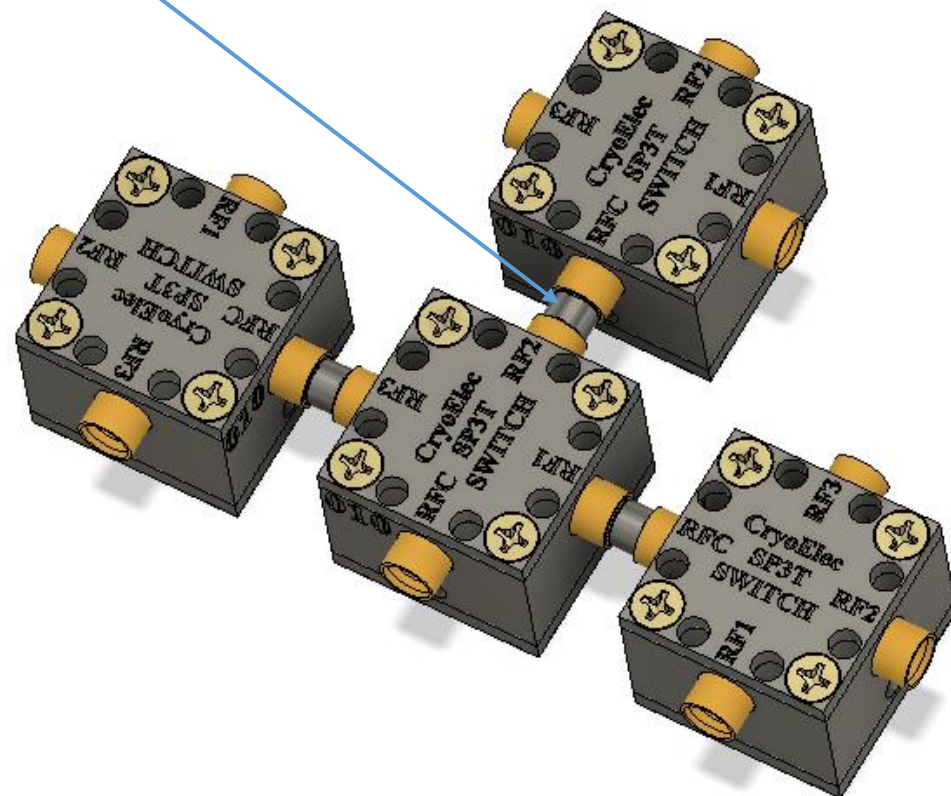
SP3T-SMPM CryoSwitch: Mechanical Drawing



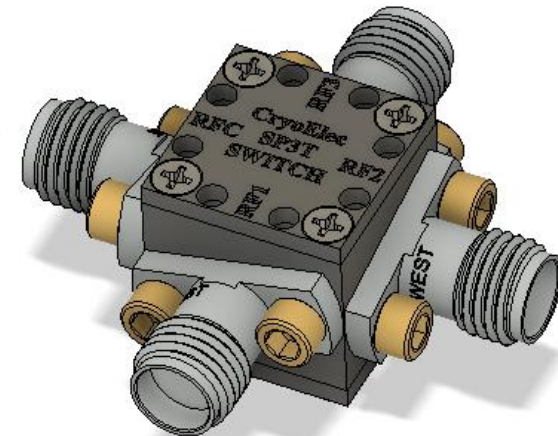
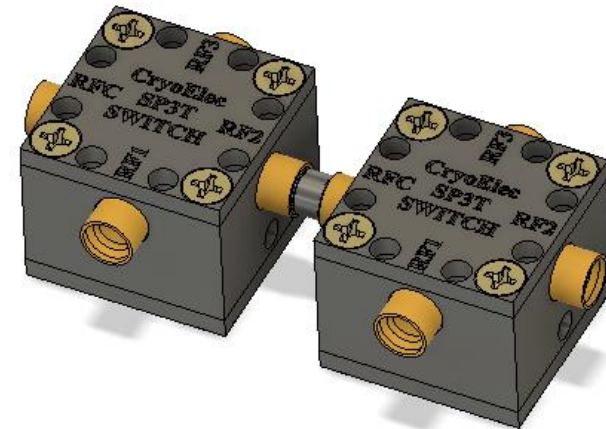
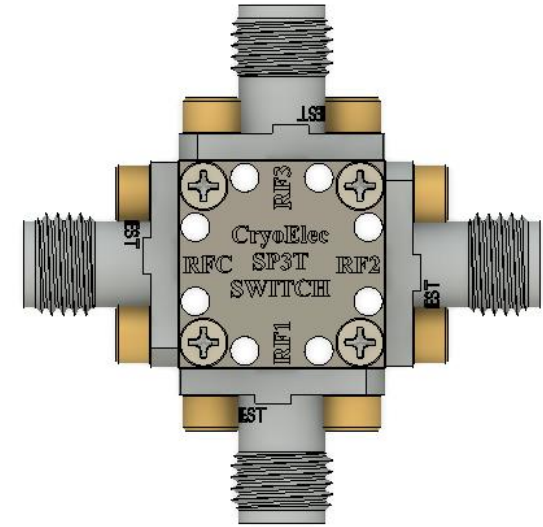
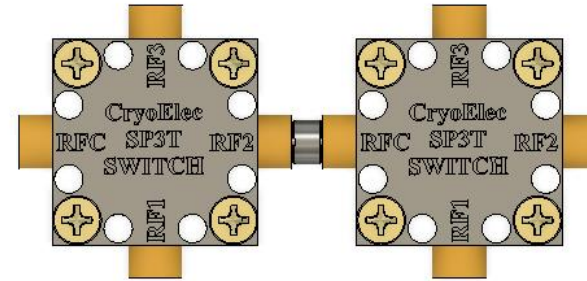
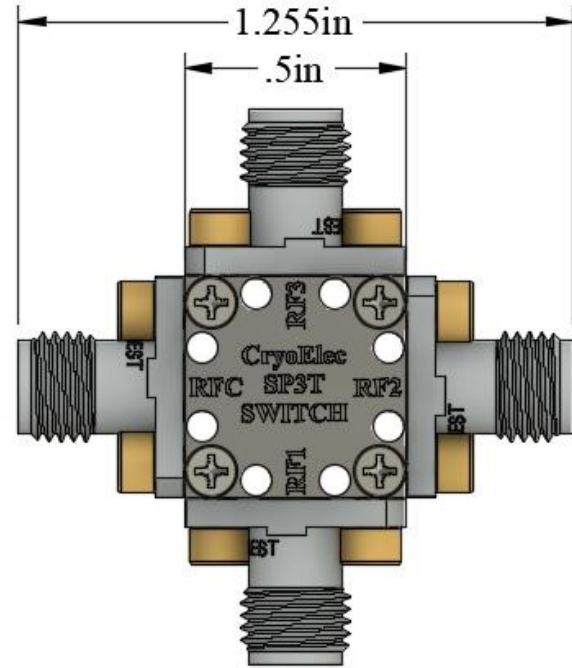
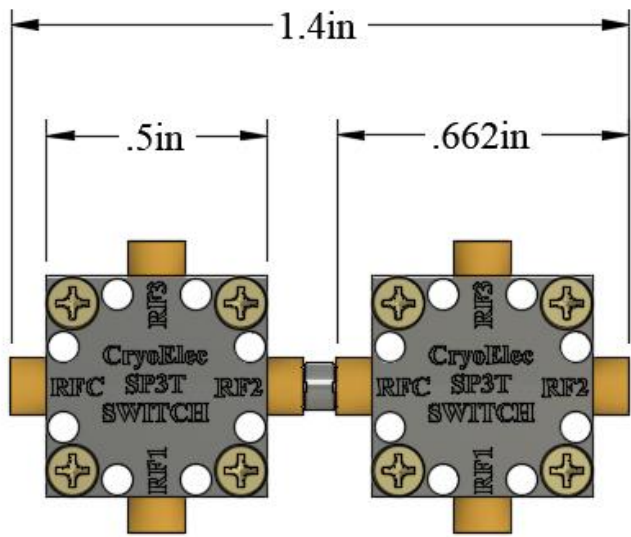
SP3T-SMPM CryoSwitch: Combining 3 x SP3T

SP6T and SP9T Switches can be made by combining 3x or 4x individual SP3T Switches

SMPM F-F Adapter
(SMPM "Bullet")



SP3T CryoSwitches: SMA - SMPM Comparison





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