

# TAGORE

TagoreTech Inc

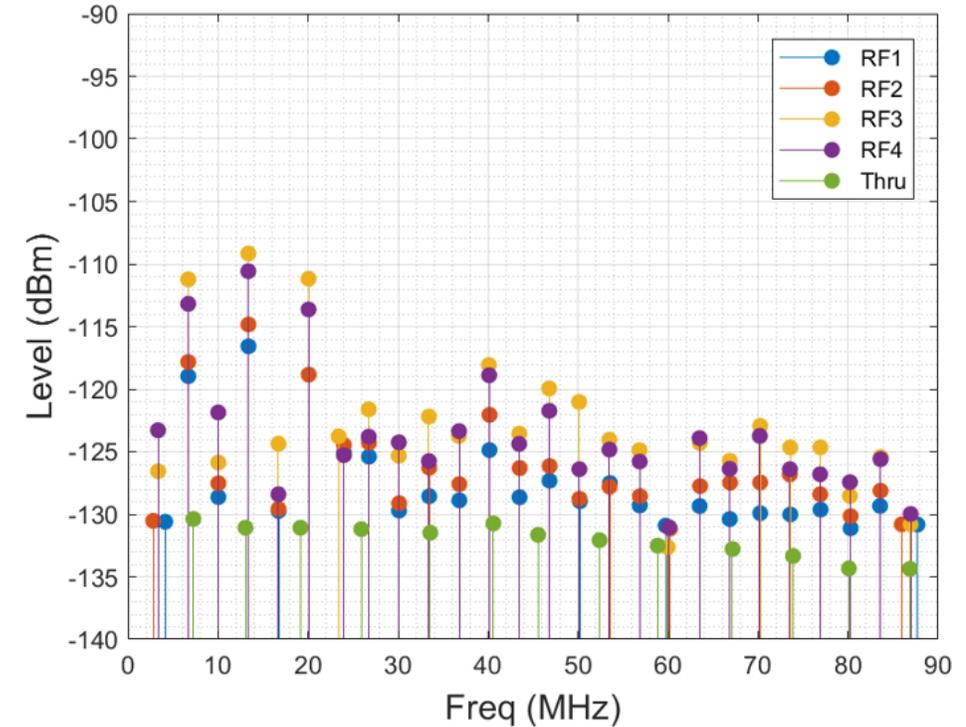
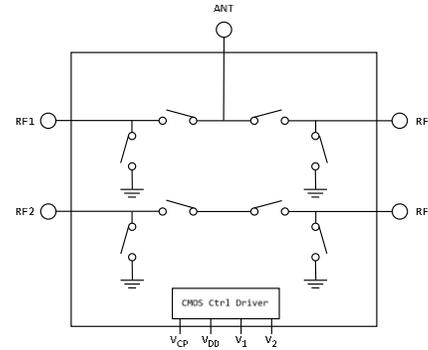
Application Note  
AN-10

High Power RF GaN Switch  
External supply voltage  
Low Noise Floor

# Background – noise from Switch charge pump

## RF GaN Switch – symmetric switch

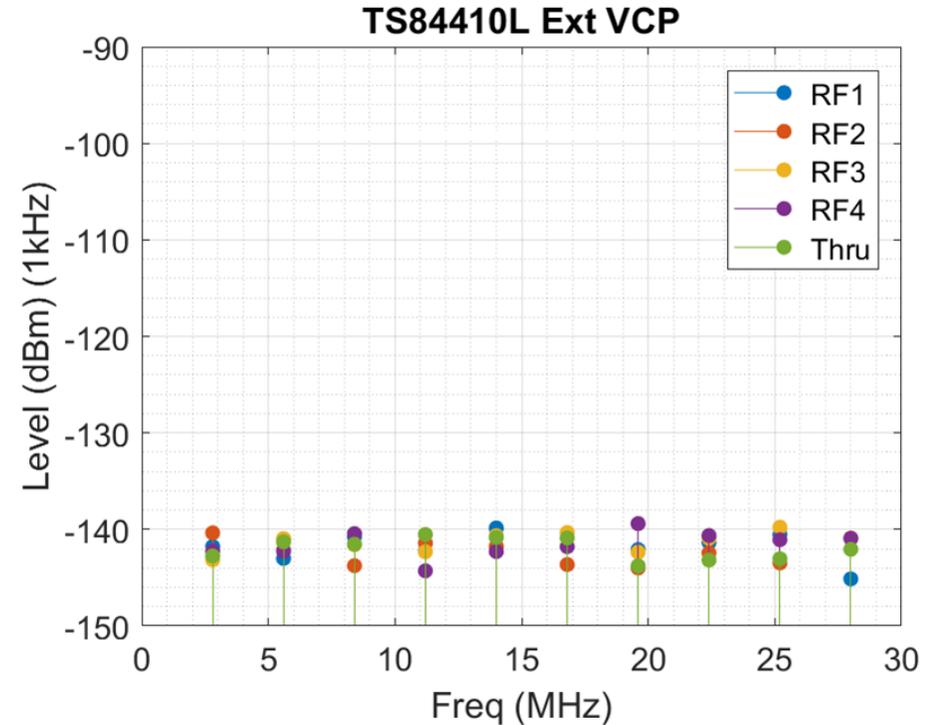
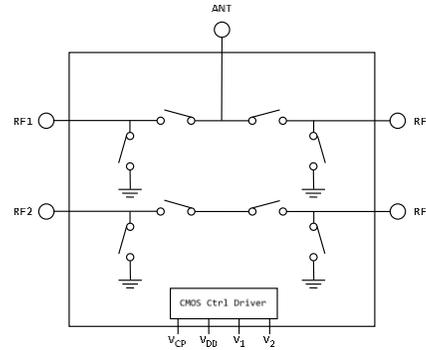
- TagoreTech RF GaN switches consist of two dies
  - RF GaN Switch die
  - CMOS controller and charge pump
  - Charge pump frequency approx. 3MHz
  - Generates spurioses as any switch mode power supply
  - Visible at HF, VHF frequencies upto **250MHz**
  - We recommend InF capacitor at  $V_{CP}$  port to reduce the effect of spurioses
- In case symmetric switch is used for Rx purposes for HF and VHF frequencies, one needs to pay attention to spurioses, if they affect receiver sensitivity



Spectrum of charge pump spurioses measured from TS8441L

# Background – noise from Switch charge pump

- **Using -0 switch with external -18V**
- Connect external -18V to VCP
- There are no source of spurioses in case charge pump is turned of
- Spectrum is clean, measurement is at noise floor (<-140dBm/1kHz)
- TagoreTech switch products with no-CP



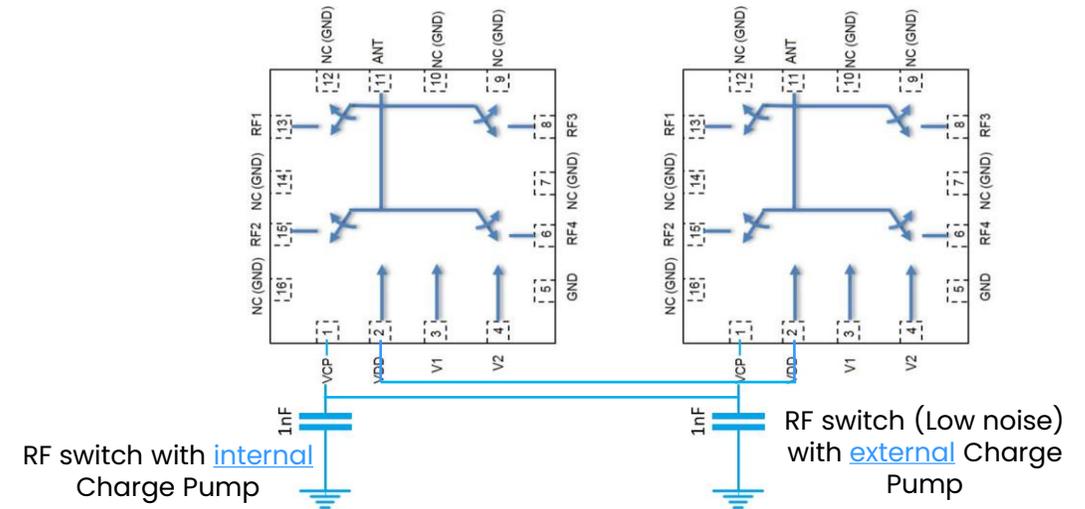
Spectrum of spurioses measured from TS84410L (no charge pump)

Part number CP		Part number no-CP
TS8242FK	→	TS82420K
TS8423K	→	TS84230K
TS8441L	→	TS84410L
TS8021N	→	TS80210N
TS8022L	→	TS80220L
TS8541L	→	TS85410L
TS8023N		Ask TagoreTech
TS8043N	→	TS80430N
TS86246P		low CP noise
TS86236P		low CP noise
TS86436P		low CP noise
TS7225FK	→	TS82250K

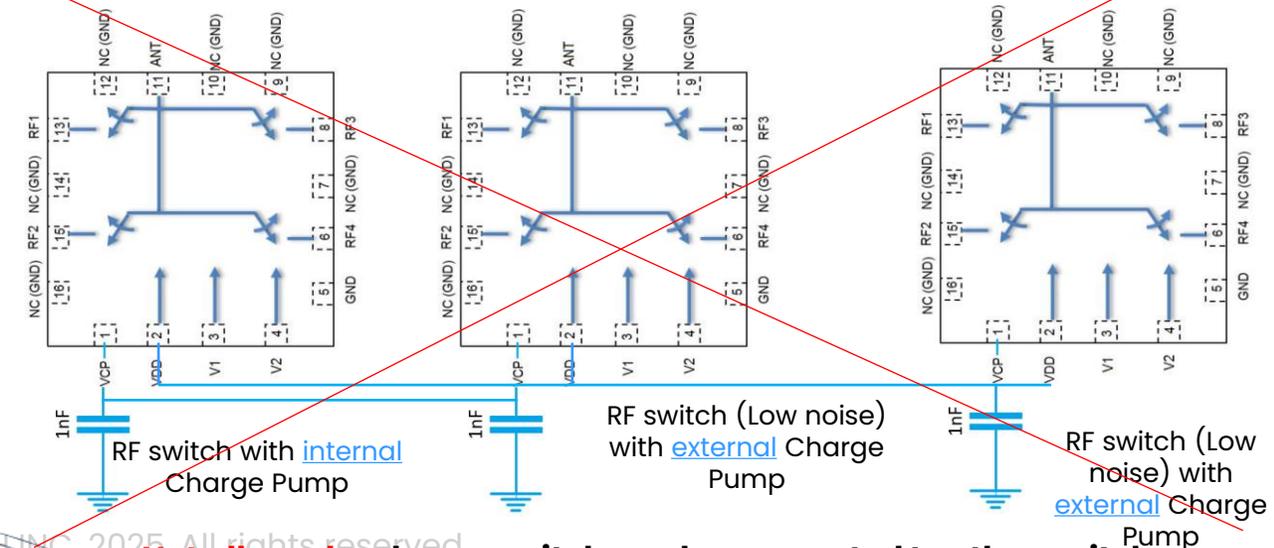
# Solution using two switches from TagoreTech

## Solution using CP switch

- TagoreTech switches with internal charge pump can be used to power non-CP version
- One can pair one CP with one non-CP switch
- Daisy chaining multiple switches not allowed



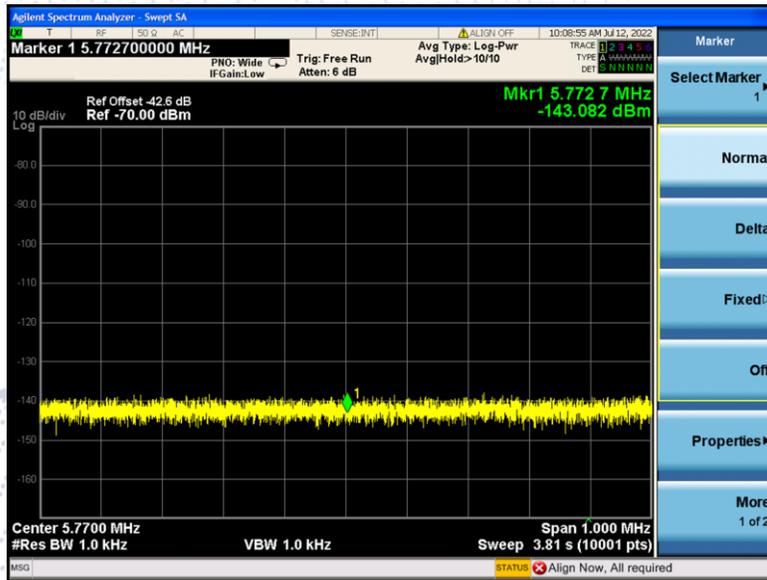
## Low noise solution (Allowed)



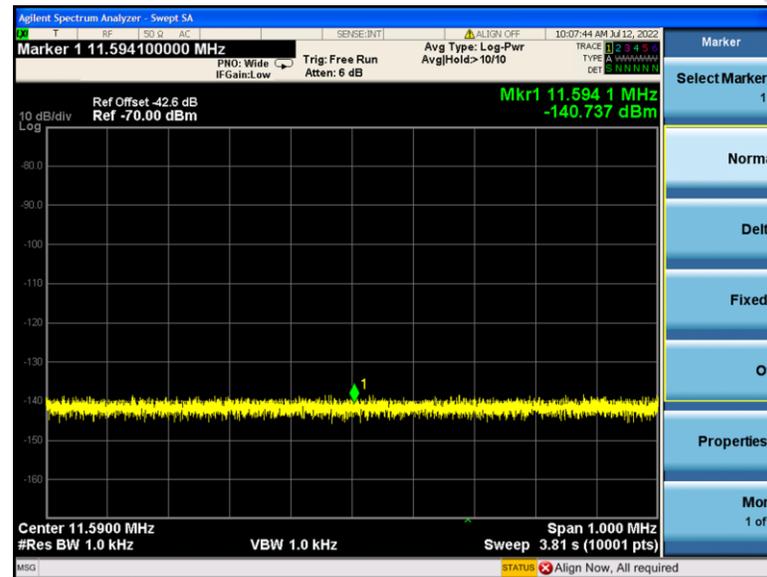
**Not allowed: only one switch can be connected to other switch**

# Appendix – spectrum measurements no-CP

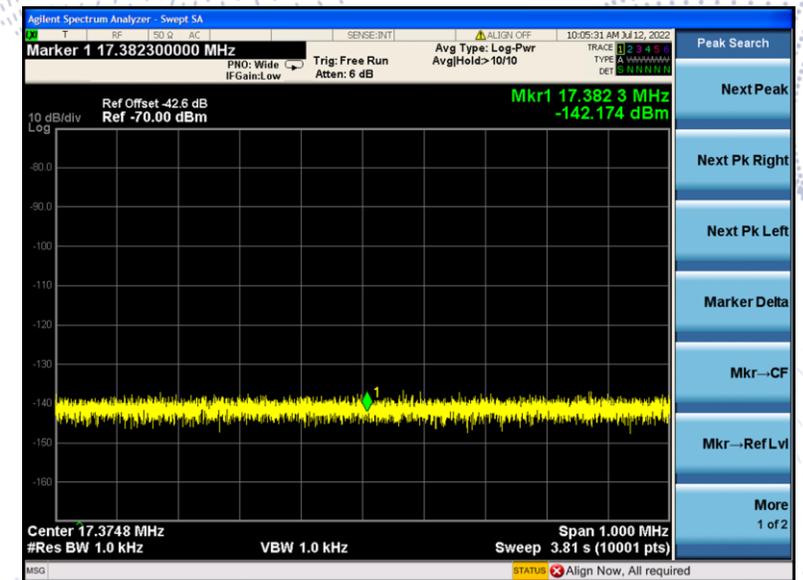
Completely clean spectrum



5.77MHz



11.59MHz



17.37MHz