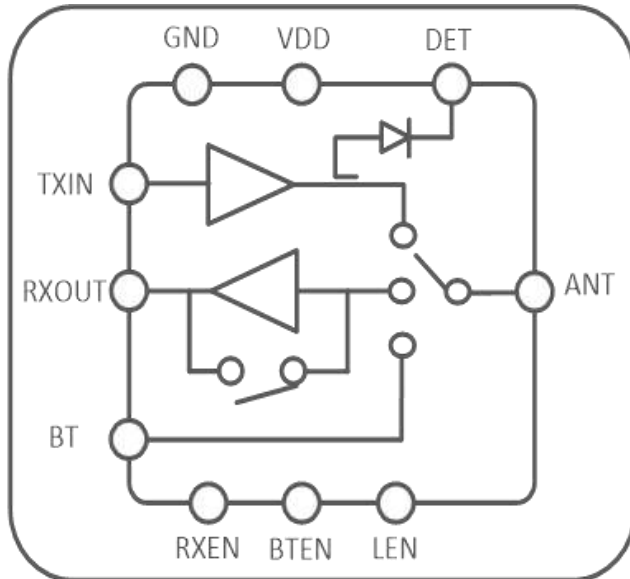




# RFX8422S CMOS Single-Chip/Single-Die 2.4GHz RFeIC with PA, LNA & SP3T for Dual-Mode WiFi/Bluetooth Operation in Mobile Devices

## Evaluation Board Test Results Summary & Technical Notes

## Functional Block Diagram



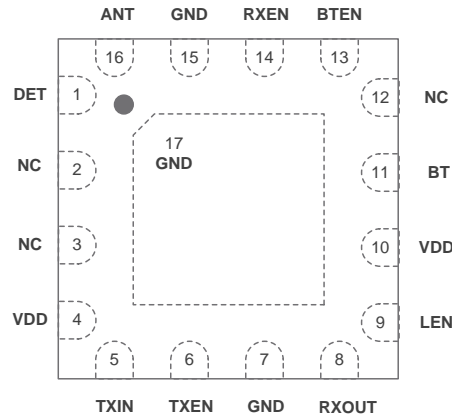
## Product Overview

- Pure CMOS Single-Chip, Single-Die RF Front-End IC
- PA + LNA + SP3T Switch + Harmonic Filters
- High Linearity PA 802.11n/ac WLAN & BT
- Low Noise Figure WLAN Receive LNA with Bypass for Near Range Operation
- 2.4 – 2.5 GHz Frequency Band
- Direct Battery Operation
- Complete On-Chip RF Decoupling and DC Block Capacitors – No External Inductors
- 2.5mm x 2.5mm x 0.45 mm, 16L QFN Package

## RFX8422S Applications

- Smartphones, Feature Phones and MIDs with WLAN/Bluetooth
- WLAN/Bluetooth Platforms Requiring Shared Antenna
- Laptop / Netbook / Smartbook with Embedded WiFi & Bluetooth
- Portable Platforms with Integrated 802.11n/ac and Bluetooth

# RFX8422S Pin-out and Pin Description



(Top "See-Through" View)

Pin Number	Pin Name	Description
1	DET	PA Power Detector Output
2, 3, 12	NC	Not Connected Internally. Can be Grounded or Left Open
4, 10	VDD	DC Voltage Supply
5	TXIN	WLAN TX Signal Port from the Transceiver: DC Shorted to GND
6	TXEN	CMOS Logic Control to Enable WLAN Transmit
7, 15, Paddle	GND	Ground – Must be Connected to Ground
8	RXOUT	WLAN RX Signal Port to the Transceiver: DC Shorted to GND
9	LEN	CMOS Logic Control to Enable LNA. Use to switch between the LNA and Bypass modes
11	BT	RF signal Port from/to the Bluetooth Transceiver: DC Shorted to GND
13	BTEN	CMOS Logic Control to Enable Bluetooth
14	RXEN	CMOS Logic Control to Enable WLAN Receive
16	ANT	RF Signal Port to/from the Antenna: DC Shorted to GND

## Recommended BOM

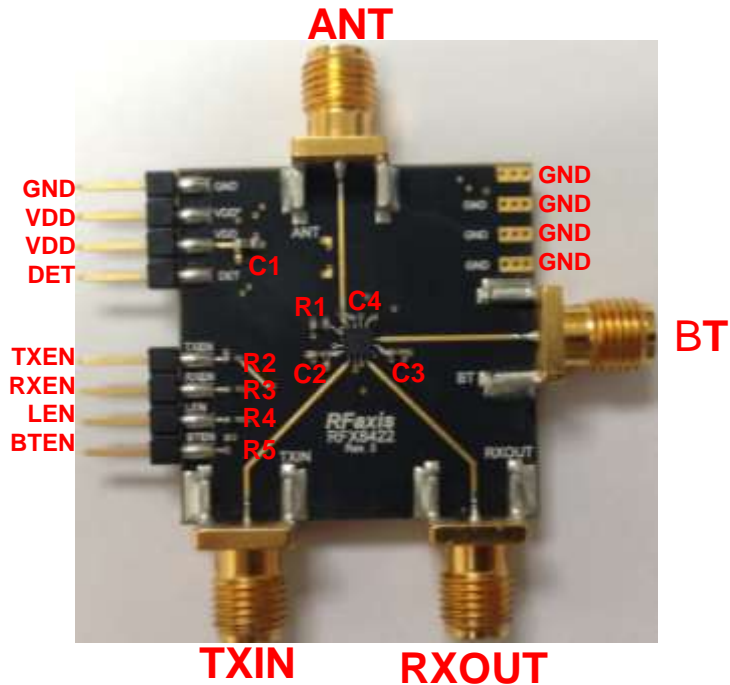
Designator	Value	Footprint	Notes
C1	2.2uF	0402	X5R/X7R
C2	220pF	0402	X5R/X7R
C3	1uF	0402	X5R/X7R
C4	0.3pF	0402	COG
R1	10KΩ	0402	Det. Load
R2, R3, R4, R5	1KΩ	0402	*

\* Only need if the control pin is directly connected to VDD.

## Control Logic Truth Table

TXEN	BTEN	RXEN	LEN	Mode of Operating
0	0	0	0	Shutdown Mode
1	0	0	0	WLAN Transmit Mode
0	0	1	1	WLAN Receive. High Gain Mode
0	0	1	0	WLAN Receive. Bypass Mode
0	1	0	0	Bluetooth Transmit/Receive Mode

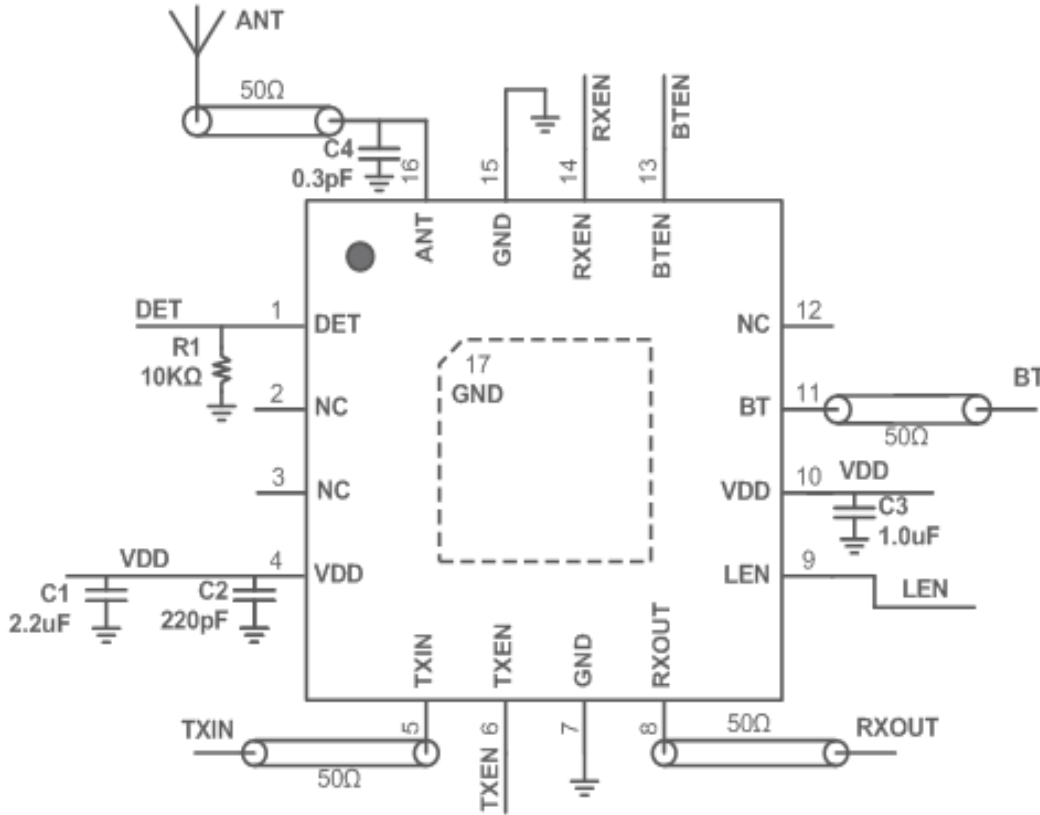
Note: "1" denotes high voltage state (> 1.2V) at Control Pins  
 "0" denotes low voltage state (< 0.3V) at Control Pins



## Evaluation Board Information:

- 4-Layer Stack, 10mil/40mil/10mil
- FR4 with  $\epsilon_r=4.5$ ,  $\tan \delta = 0.02$  (Typ)
- RFIN, RFOUT trace losses are  $\sim 0.25\text{dB}$  @ 2.4GHz – 2.5GHz
- Results in following slides are referenced to device pins with the trace loss de-embedded
- VDD should be on before applying ctrl signals
- VDD Nominal 3.6 Vdc. Operational from 2.9 to 4.5 Vdc with limitations.

# Recommended Application Schematic and BOM



Nominal VDD = 3.6 Vdc  
 Operation from 2.9 to 4.5 Vdc with limitations

Designator	Value	Footprint	Notes
C1	2.2uF	0402	X5R/X7R
C2	220pF	0402	X5R/X7R
C3	1uF	0402	X5R/X7R
C4	0.3pF	0402	COG
R1	10KΩ	0402	*

\* Detector Voltage will vary with different resistor loads.

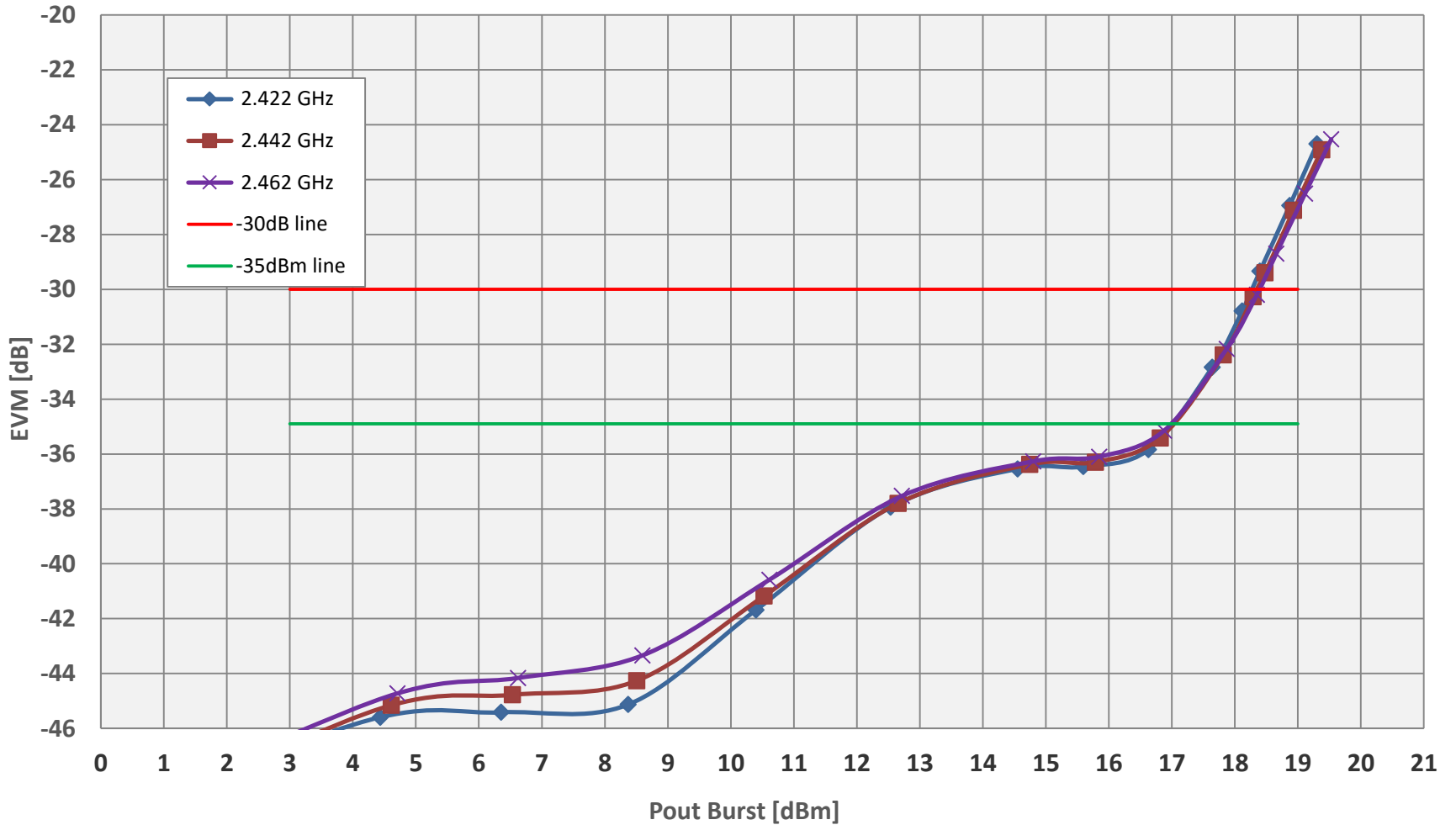
## EVB Signal Loss De-Embedding

RF Signal	Loss
ANT	.20 dB
TX	.20 dB
RX	.25 dB
BT	.25 dB

**Total EVB Loss Includes the Trace and Connector**

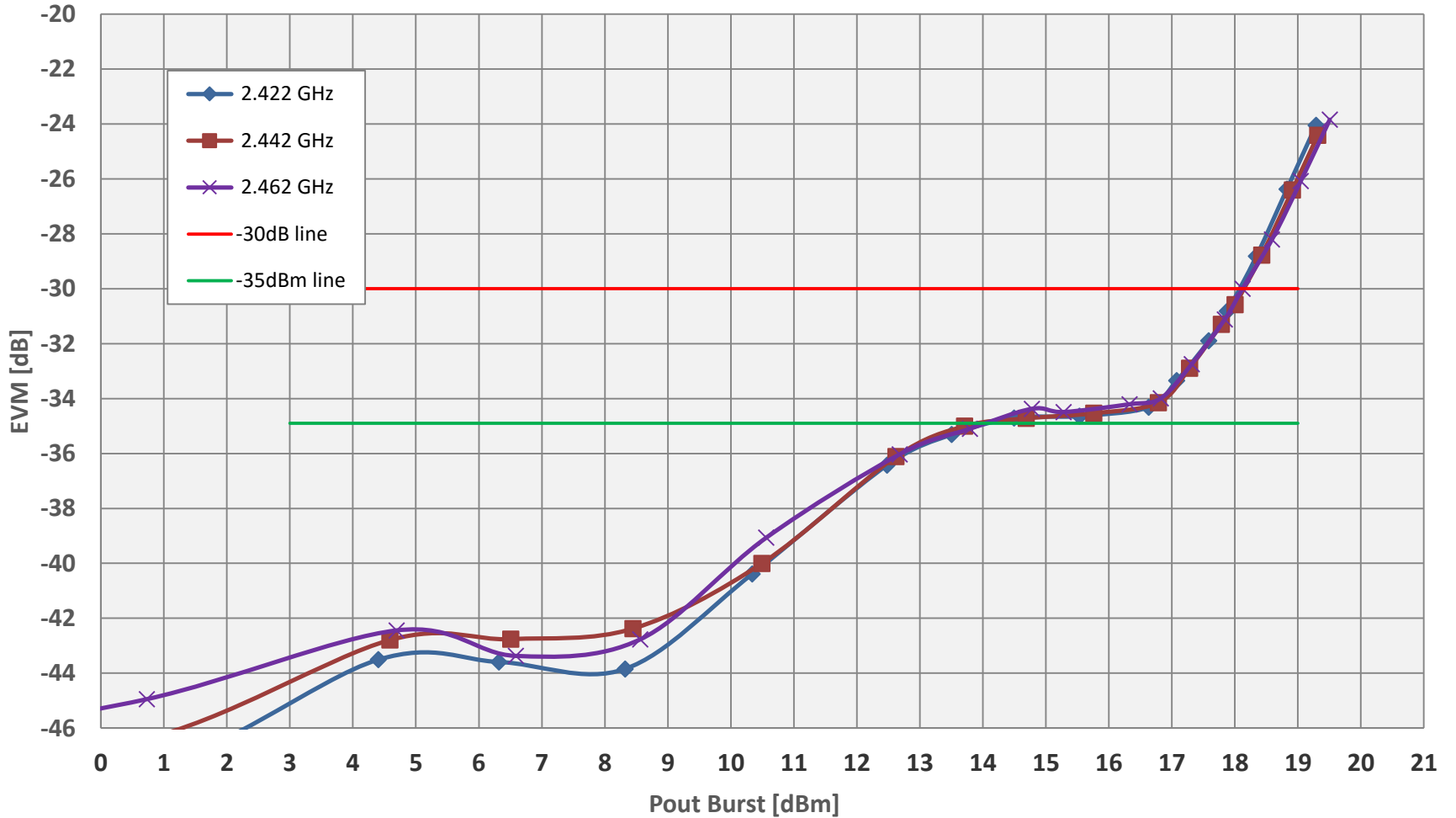
# RFX8422S DEVM vs. Output Power over Frequency 802.11g 64 QAM

DEVM [dB] VDD = 3.6V



# RFX8422S DEVM vs. Output Power over Frequency 802.11n HT20 MCS7

DEVM [dB] VDD = 3.6V

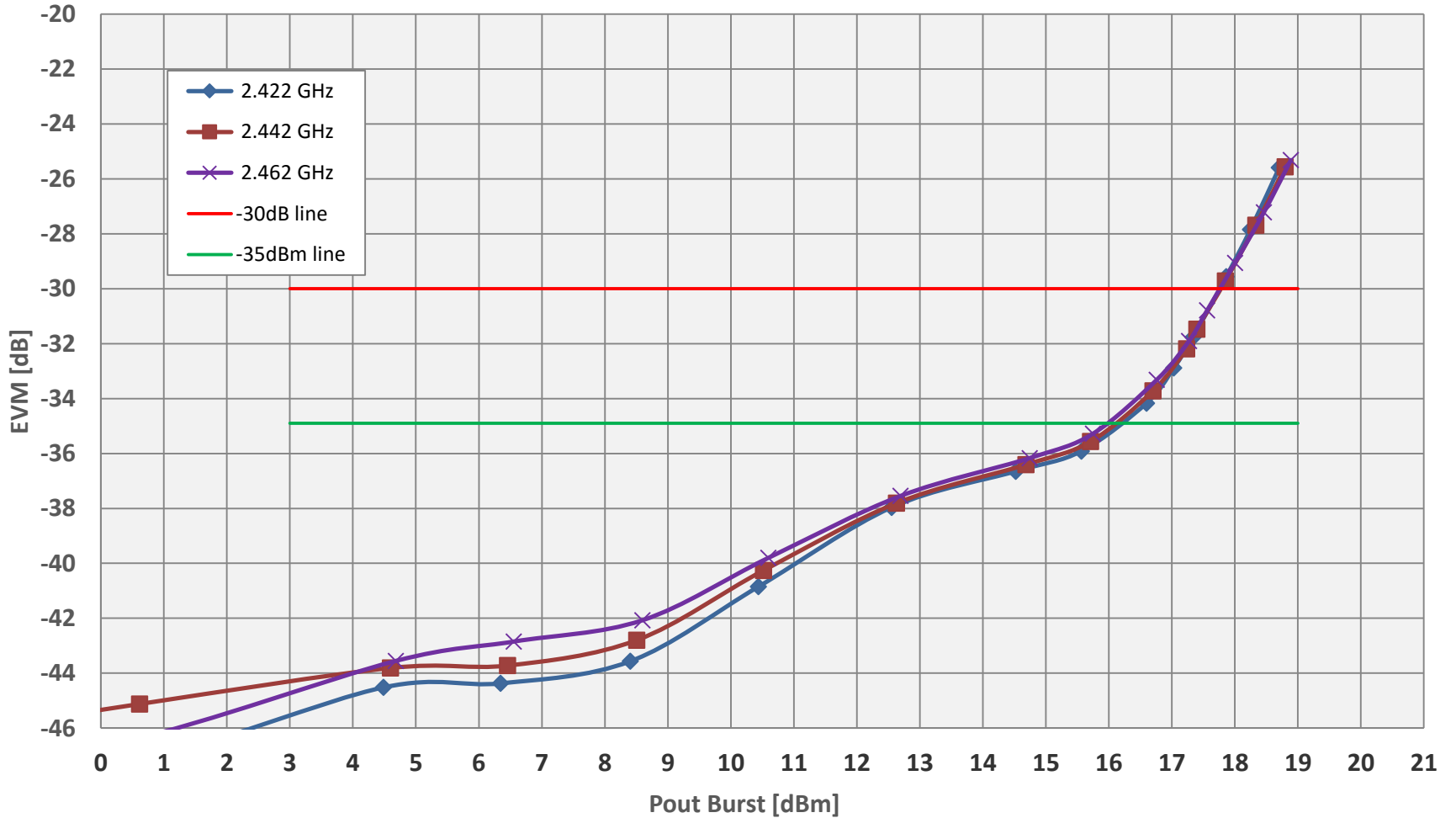




# RFX8422S DEVM vs. Output Power over Frequency

## 802.11n HT40 MCS7

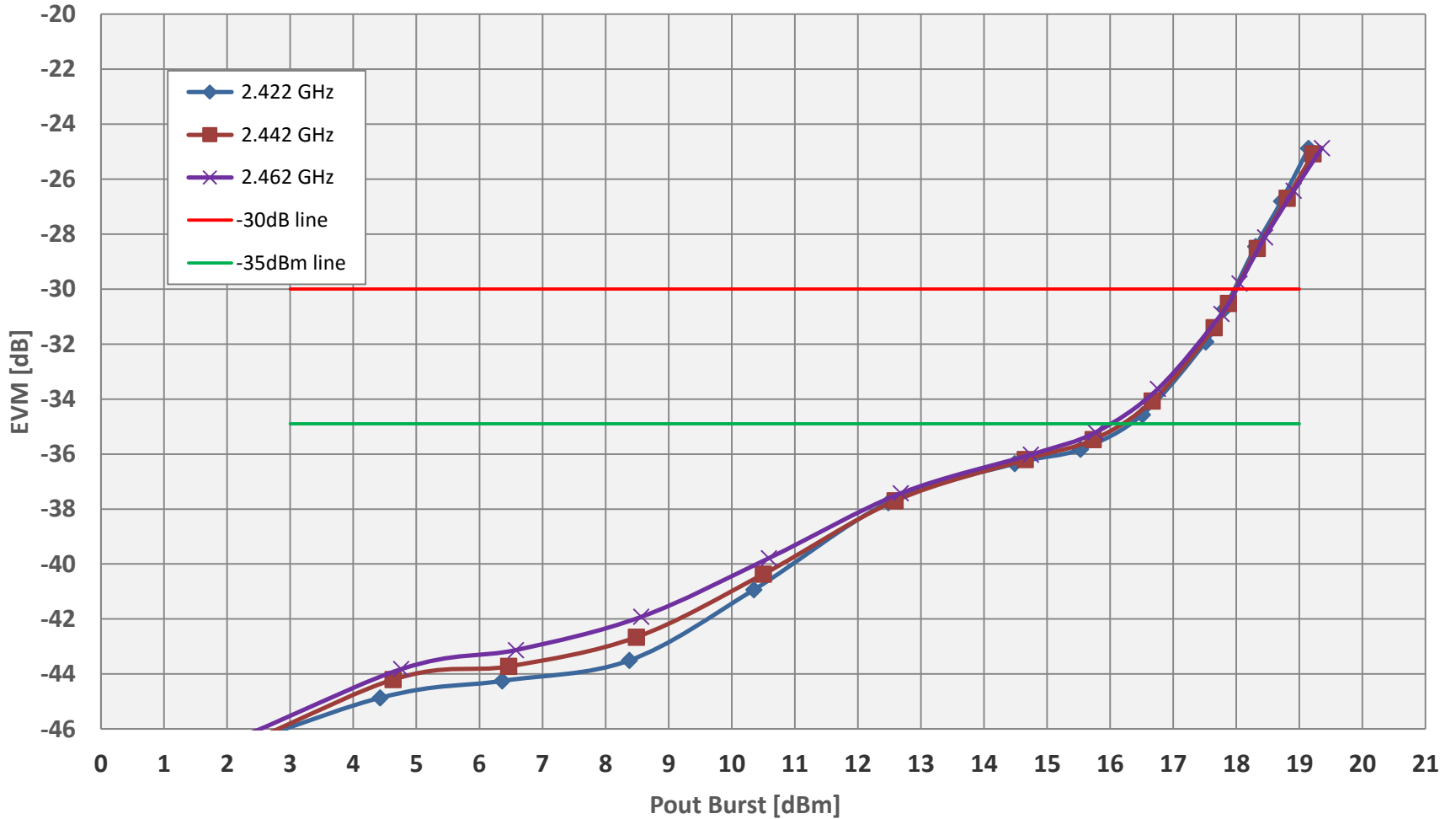
DEVM [dB] VDD = 3.6V



# RFX8422S DEVM vs. Output Power over Frequency

## 802.11ac VHT40 MCS9

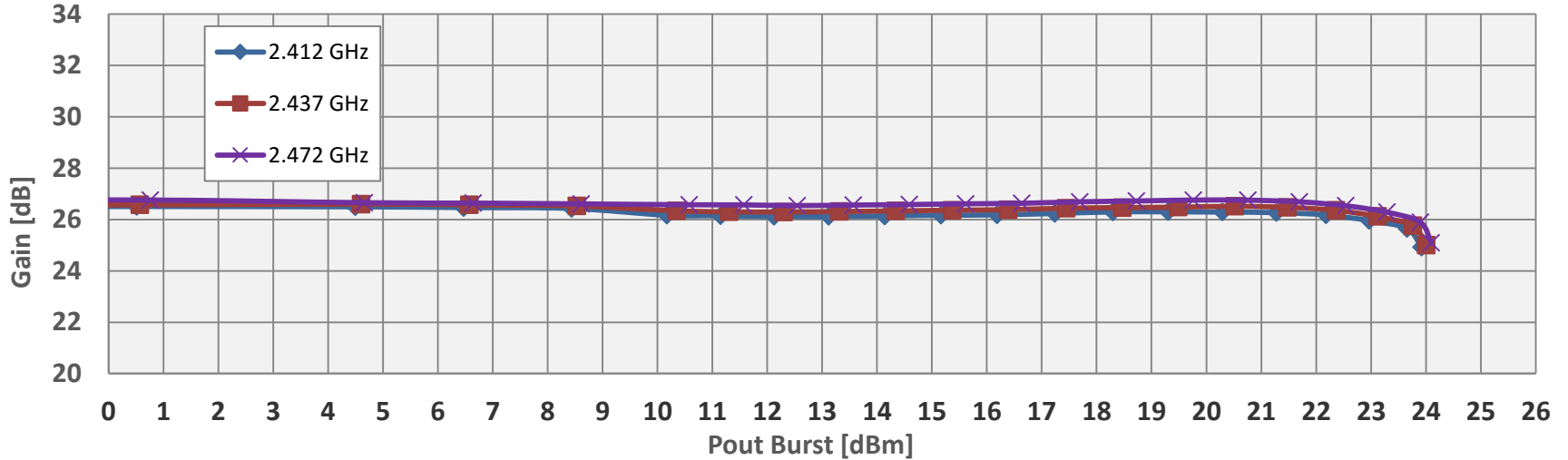
DEVM [dB] VDD = 3.6V



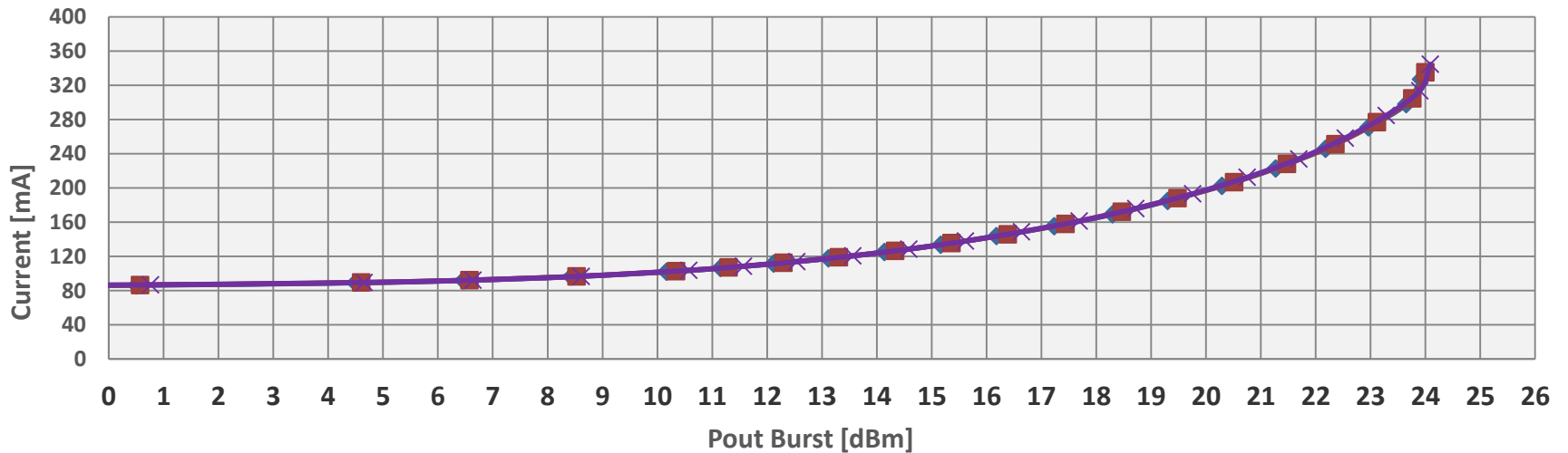
# RFX8422S Gain and Current over Frequency

## VDD = 3.6V

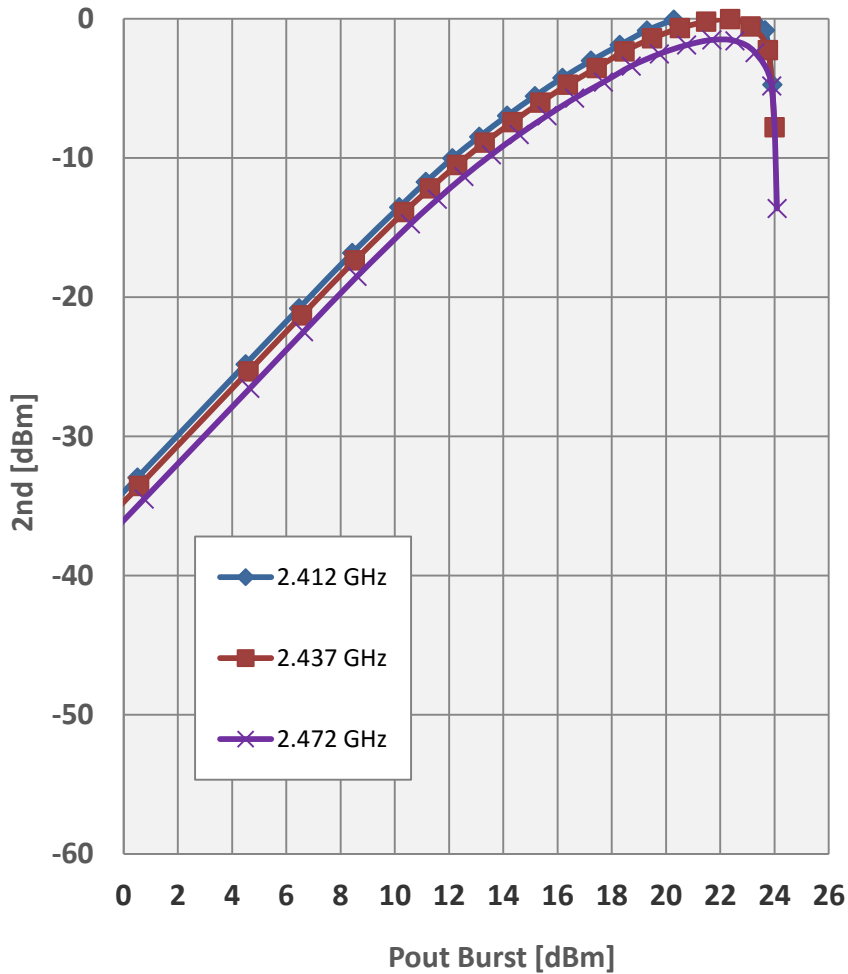
### Gain VDD = 3.6



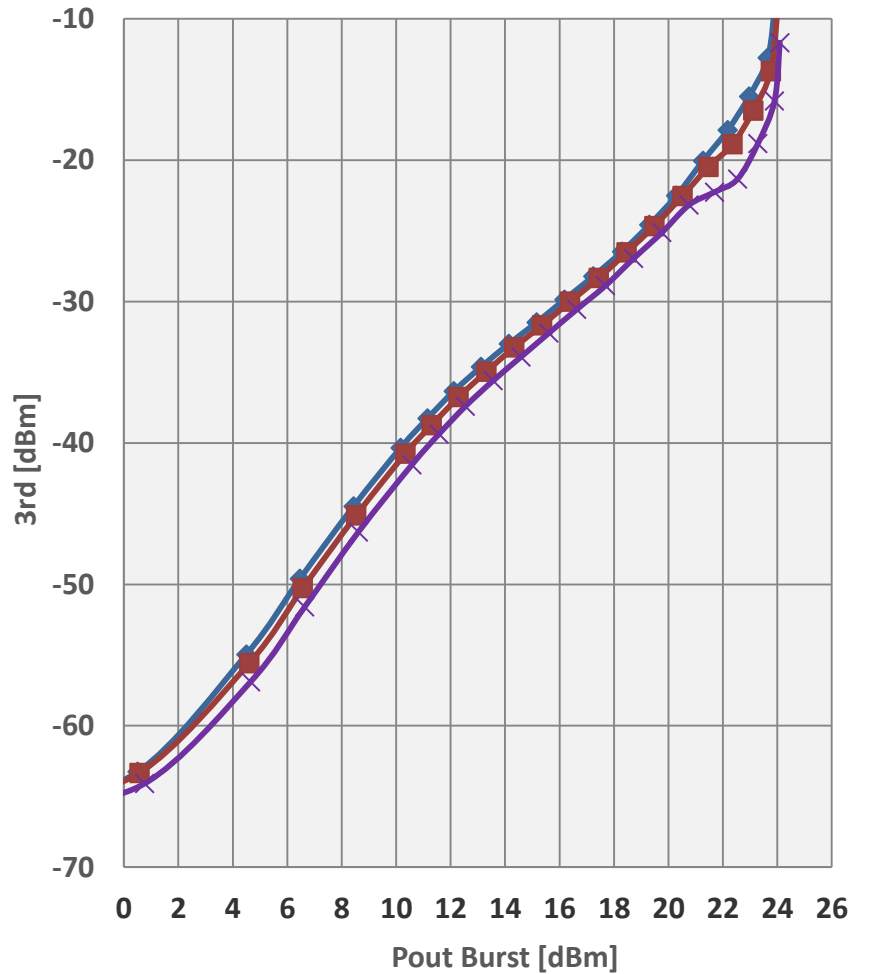
### Max Current VDD = 3.6



## 2nd Harmonic

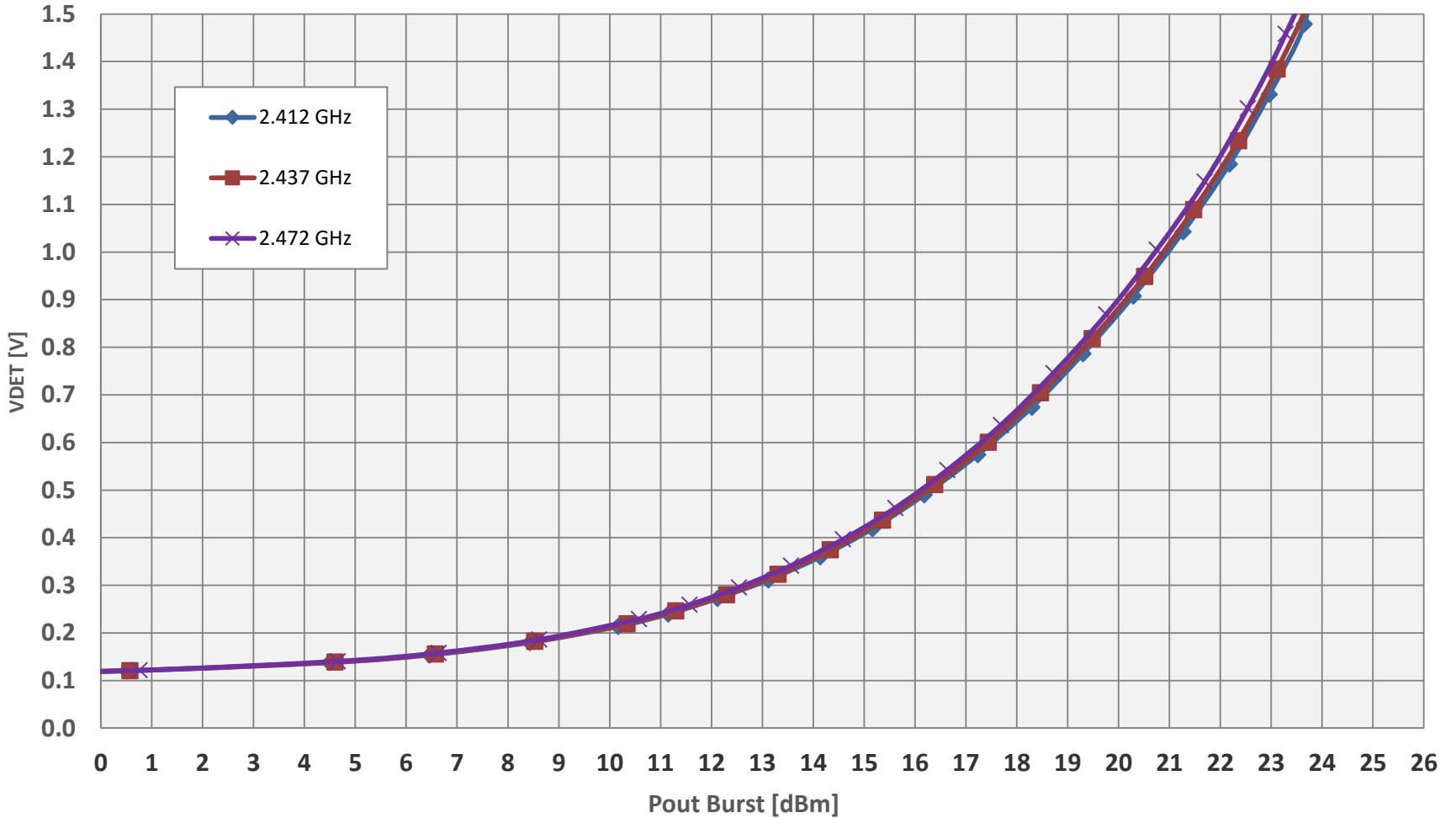


## 3rd Harmonic



# RFX8422S Detector Output Voltage vs. Pout, over Frequency CW Signal

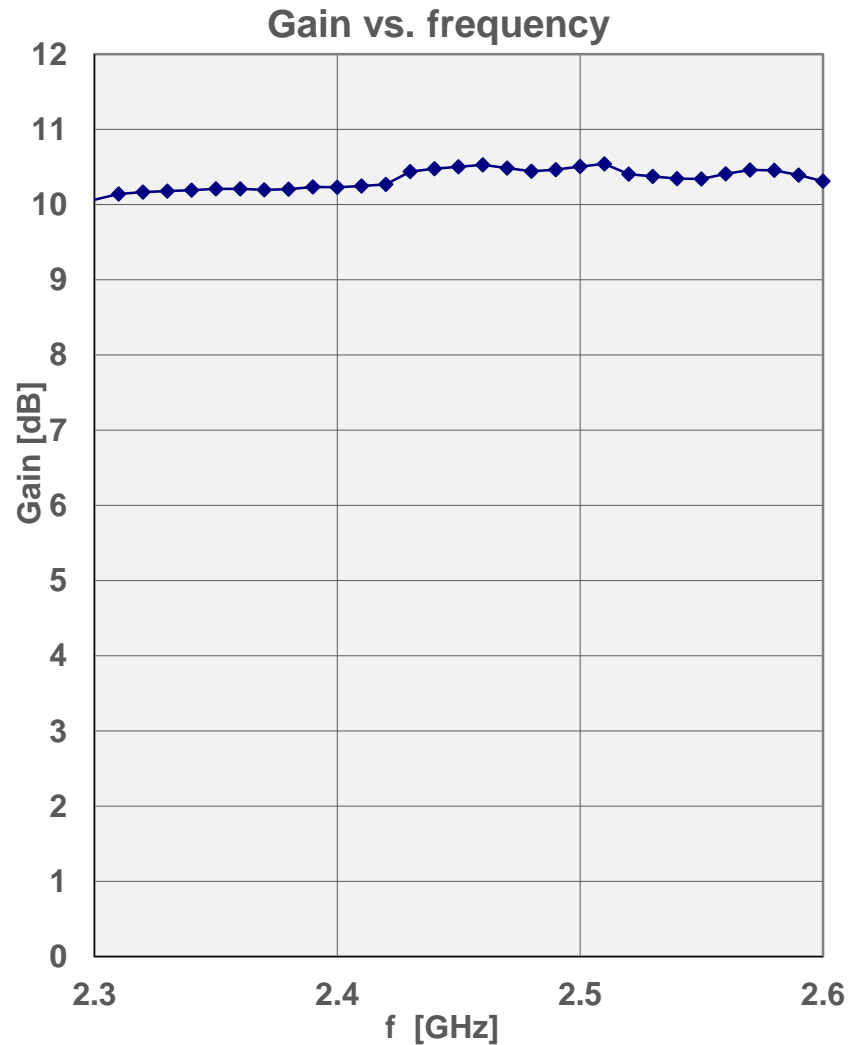
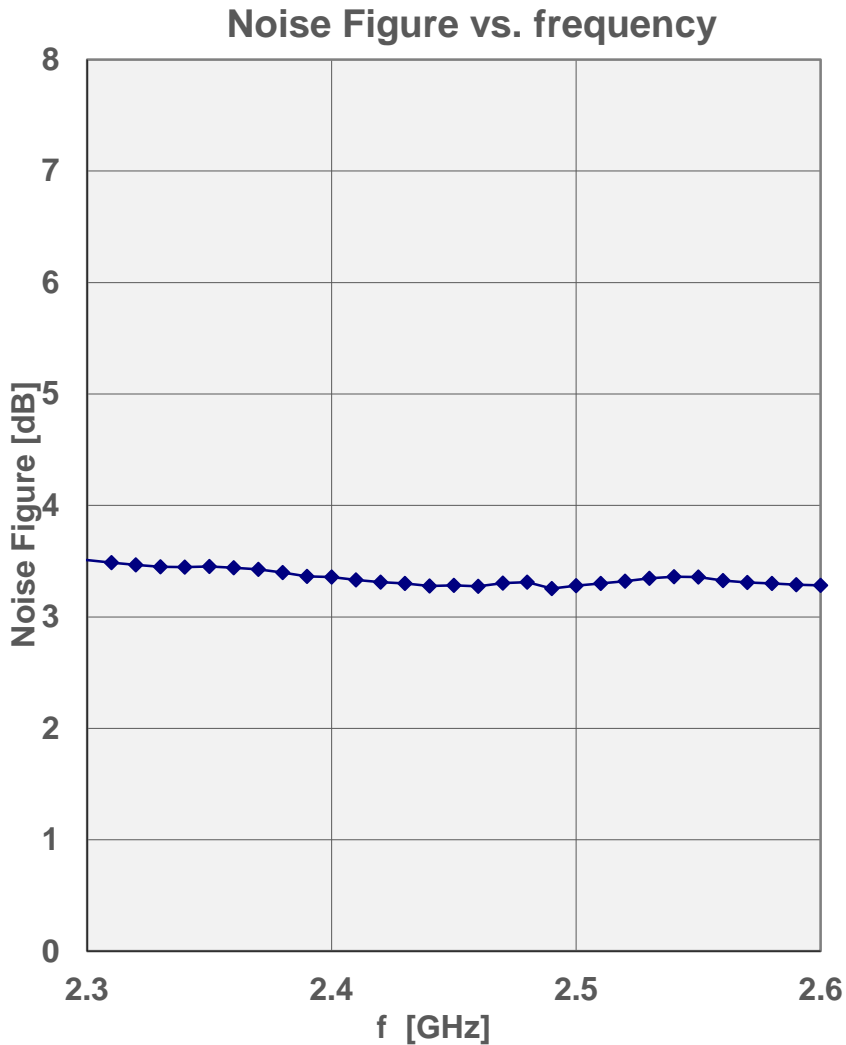
Vdet VDD = 3.6



Detector voltage measured with 10kΩ load. Detector voltage will be vary with different resistor load values.

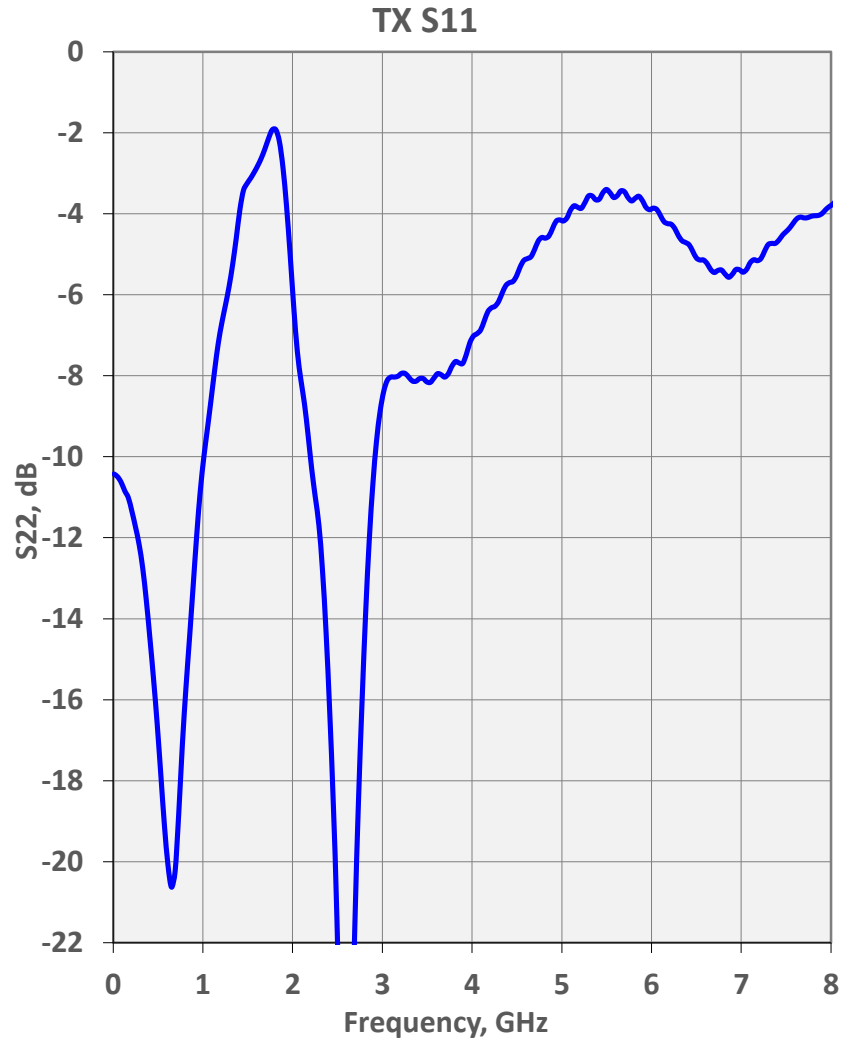
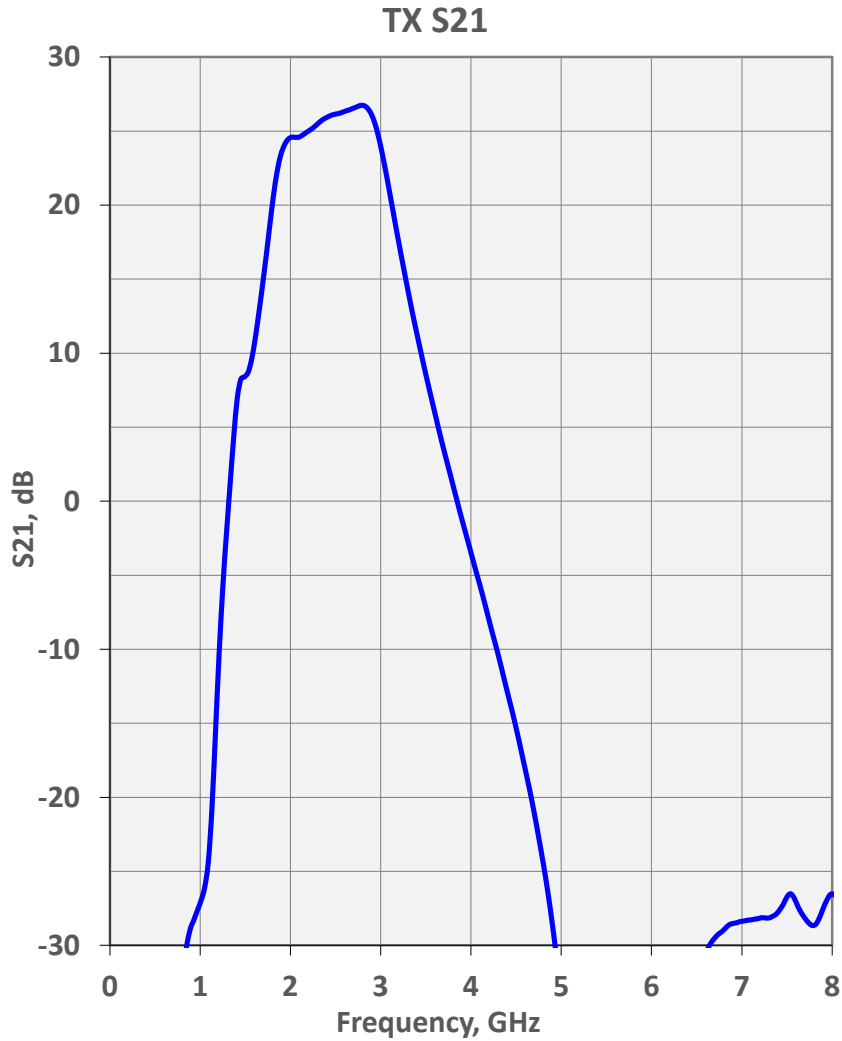
# RFX8422S LNA Gain and Noise Figure vs. Frequency

VDD = 3.6V

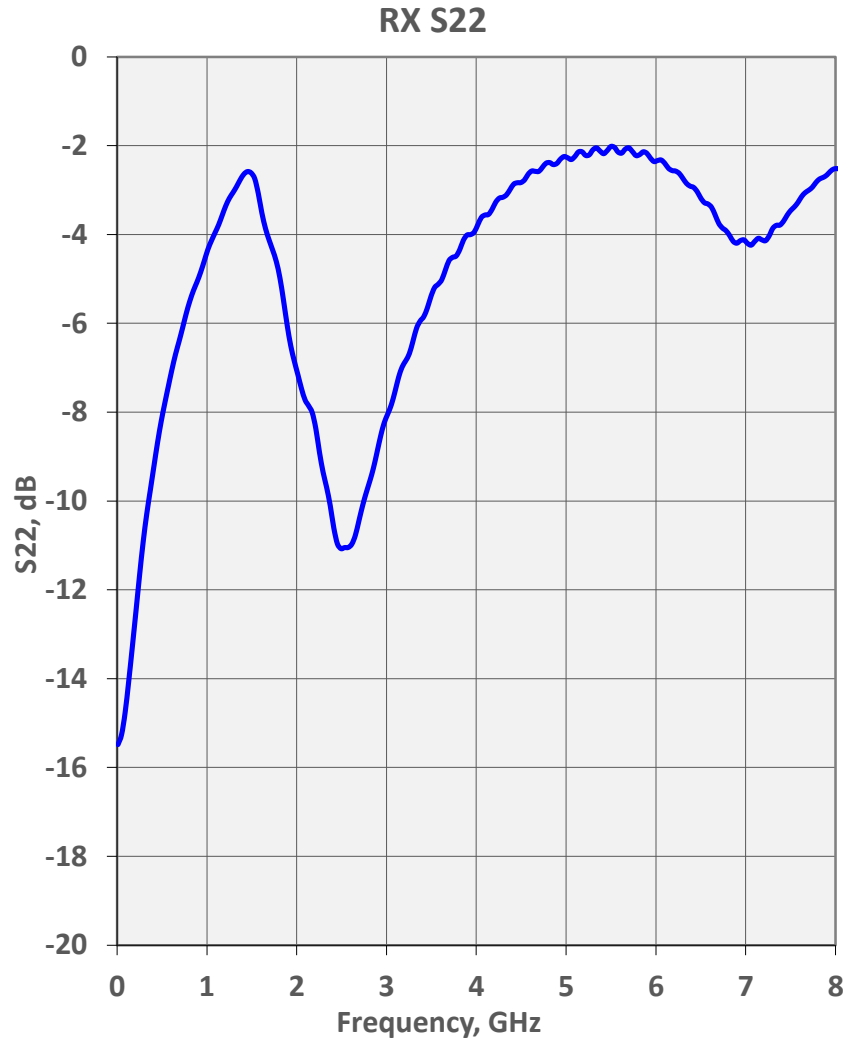
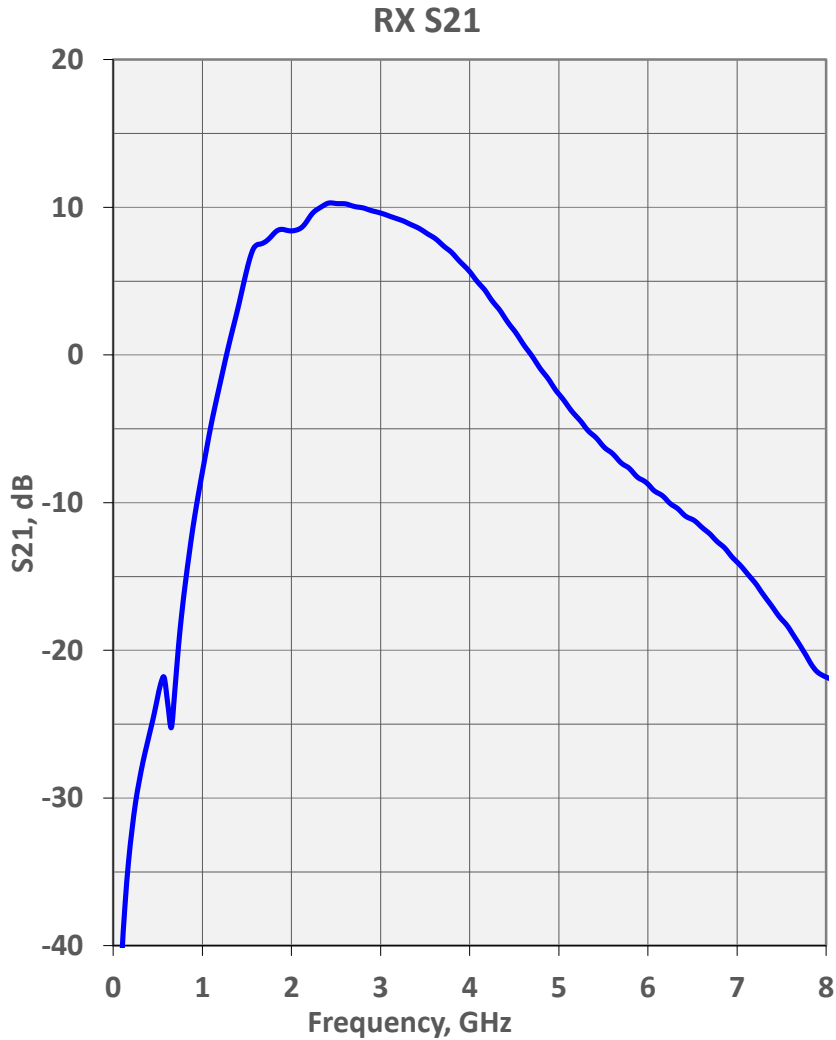


RXEN=High, LEN=High, TXEN=BTEN=Low, Iq= 12 mA

# RFX8422S TX Small-Signal S21, S11



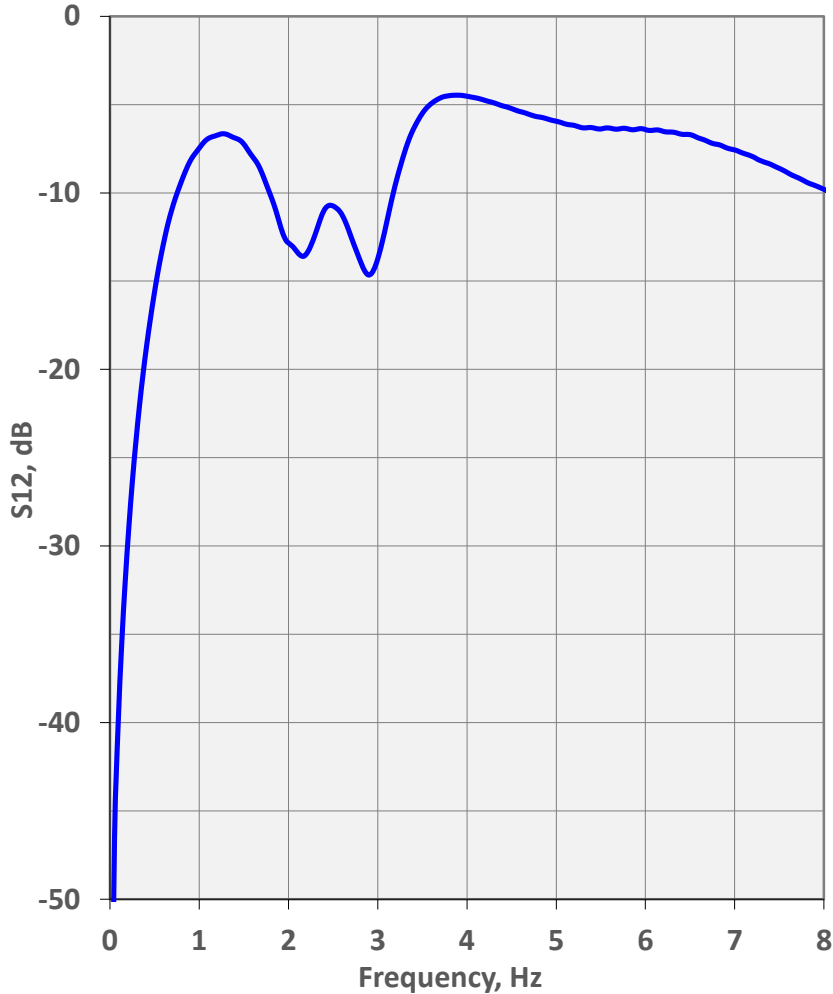
TXEN=High, RXEN=BTEN=Low, Icq~90mA @ VDD=3.6V



RXEN LEN=High, TXEN=BTEN=Low, LNA Iq= 12 mA

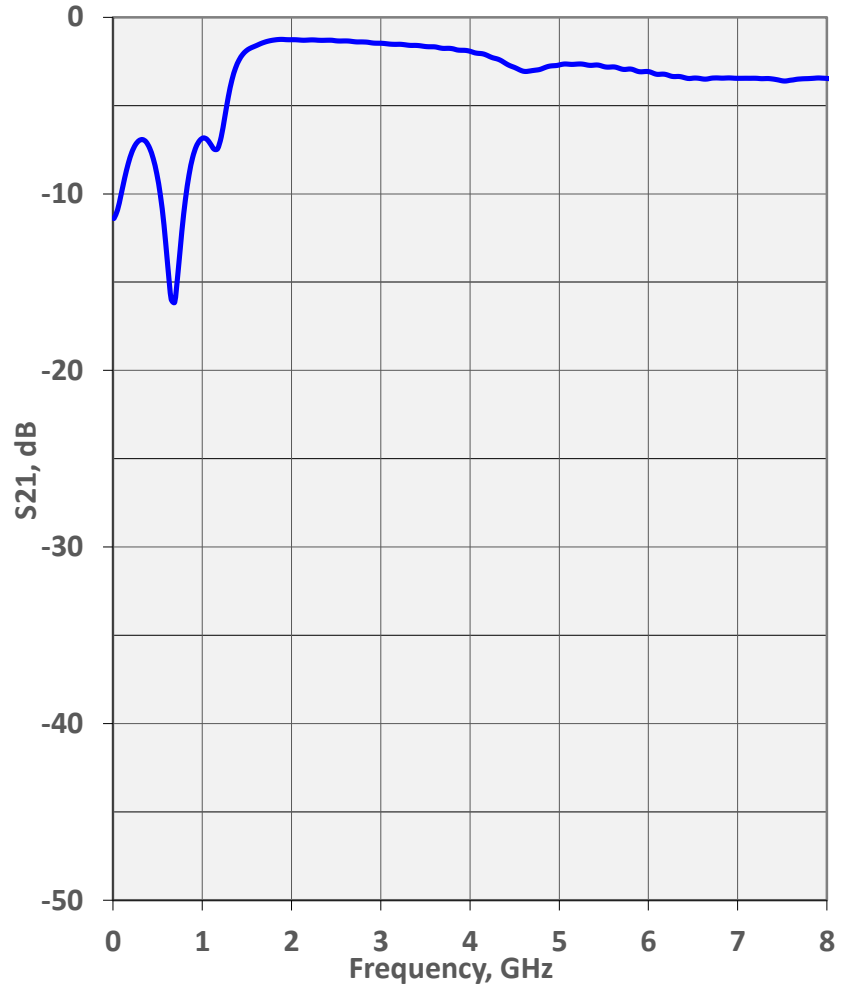


### RX Bypass S21



TXEN LEN BTEN=Low, RXEN=High, Iq= 1 mA

### BT S21

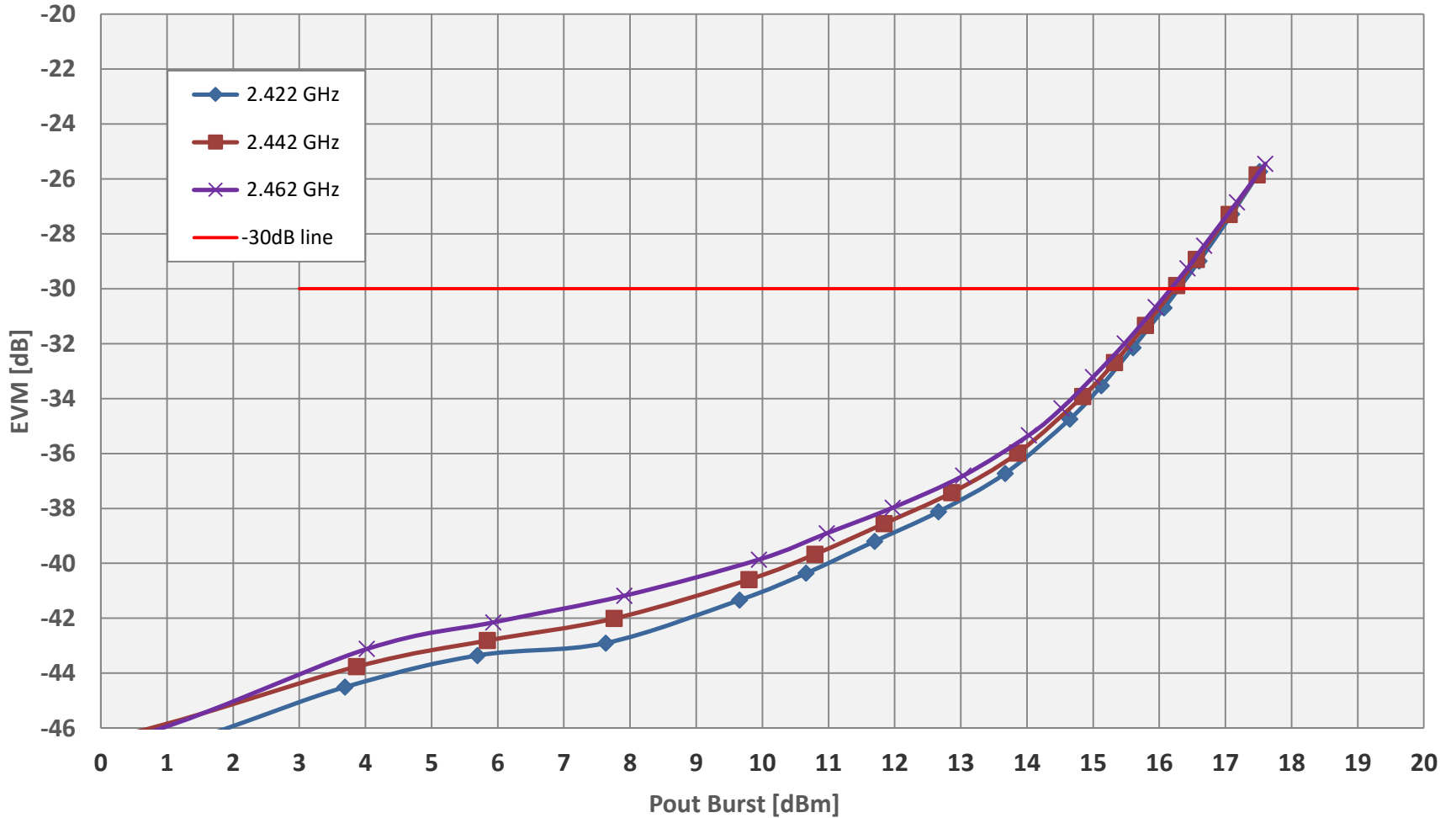


TXEN RXEN LEN=Low, BTEN=High, Iq= 1 mA

**RFX8422S**  
**VDD = 3.3V**  
**Supplemental Data**

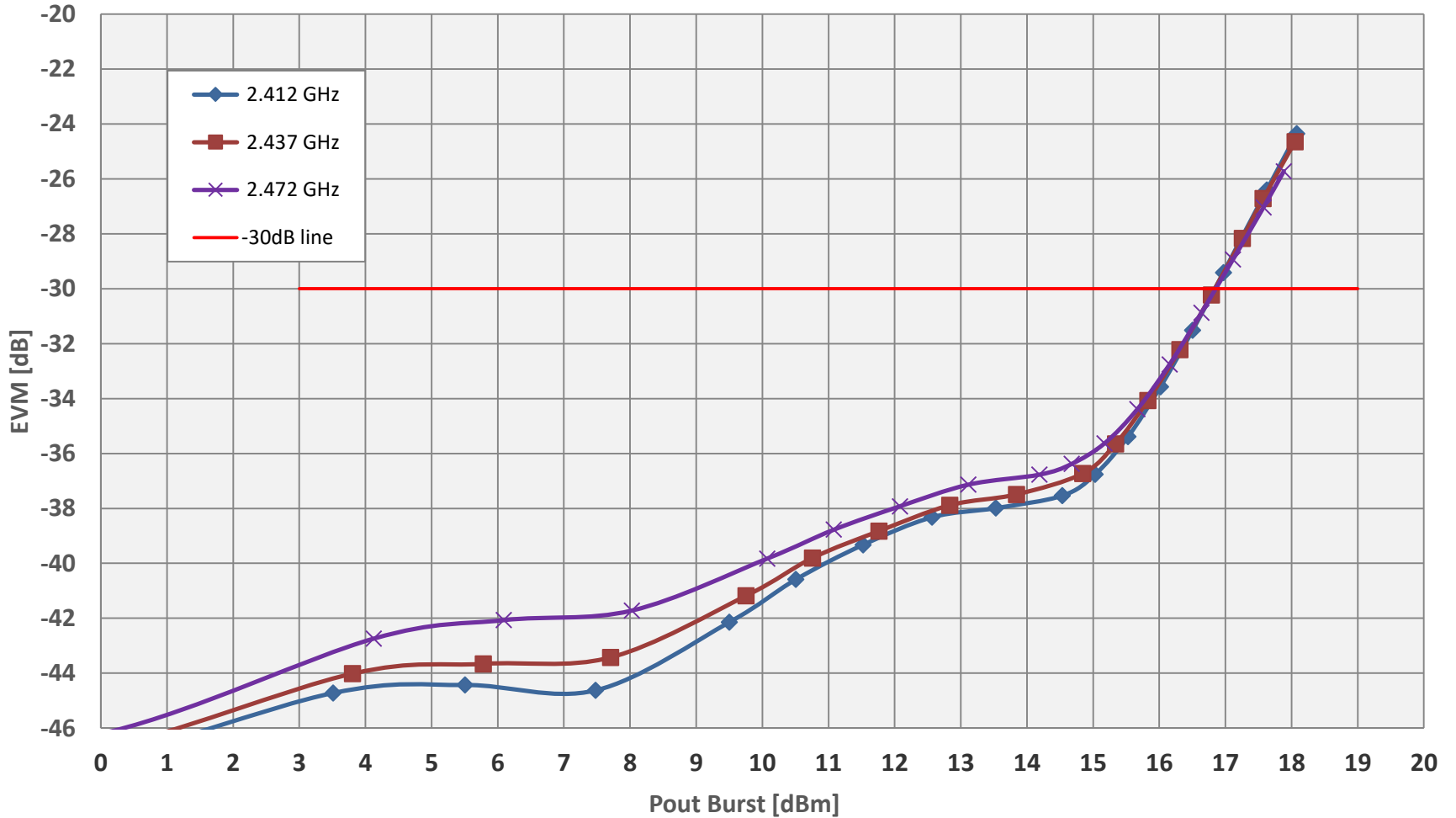
# RFX8422S DEVM vs. Output Power over Frequency 802.11n HT40 MCS7

DEVM [dB] VDD = 3.3V



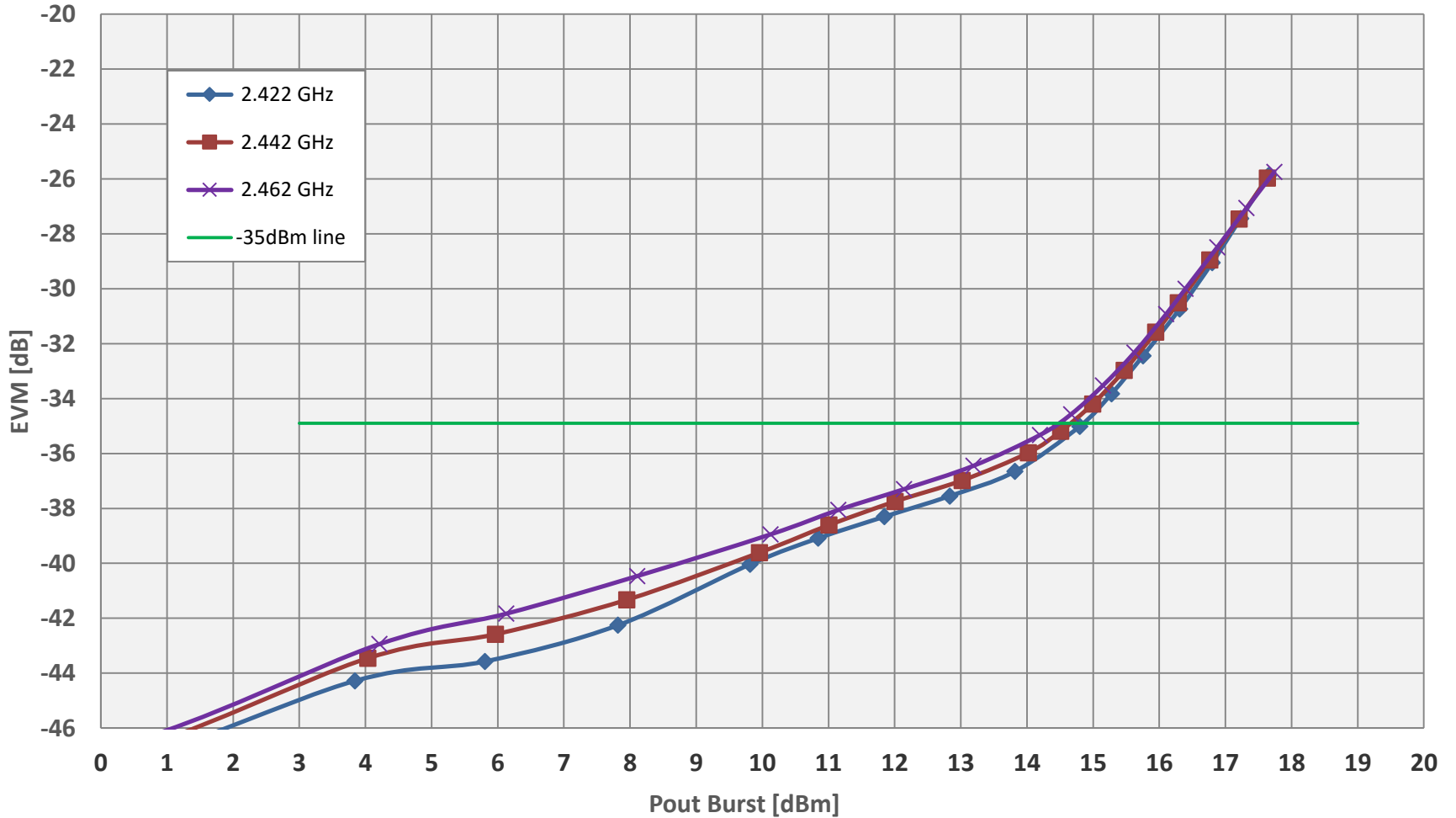
# RFX8422S DEVM vs. Output Power over Frequency 802.11n HT20 MCS7

DEVM [dB] VDD = 3.3V



# RFX8422S DEVM vs. Output Power over Frequency 802.11ac HT40 MCS9

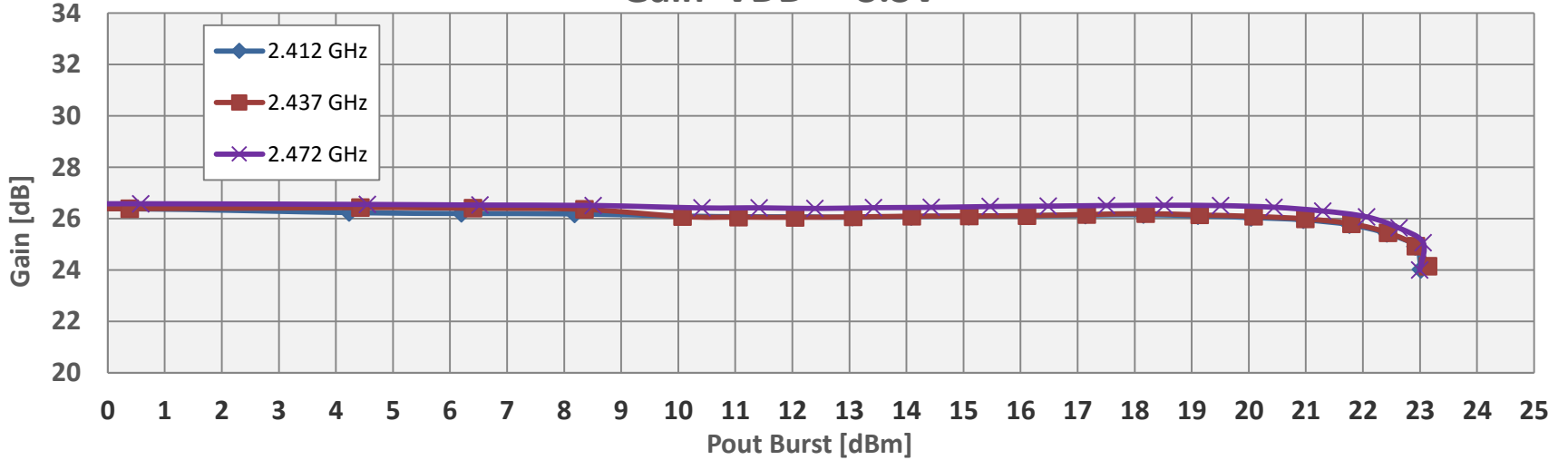
DEVM [dB] VDD = 3.3V



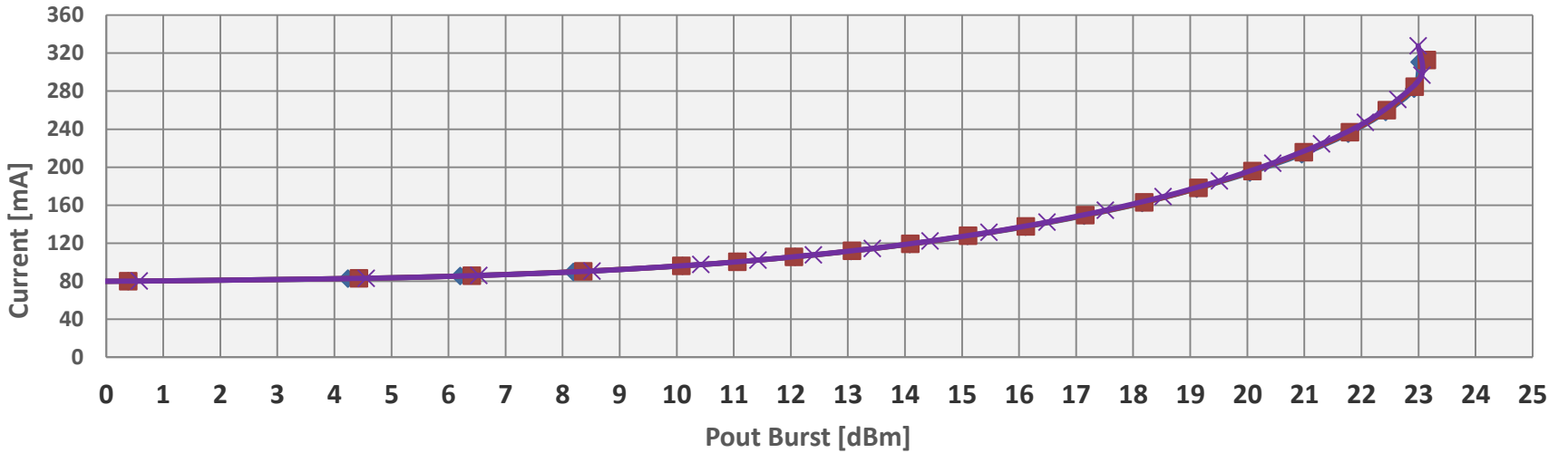
# RFX8422S CW Gain and Current over Frequency

VDD = 3.3V

## Gain VDD = 3.3V



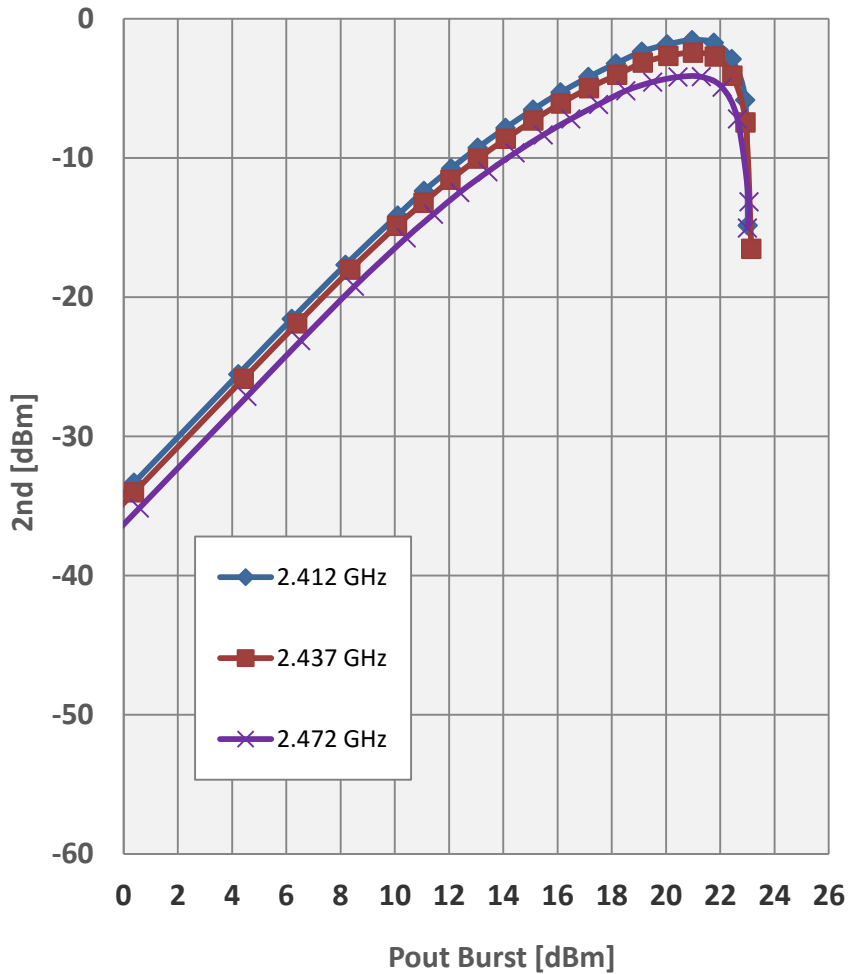
## Max Current VDD = 3.6V



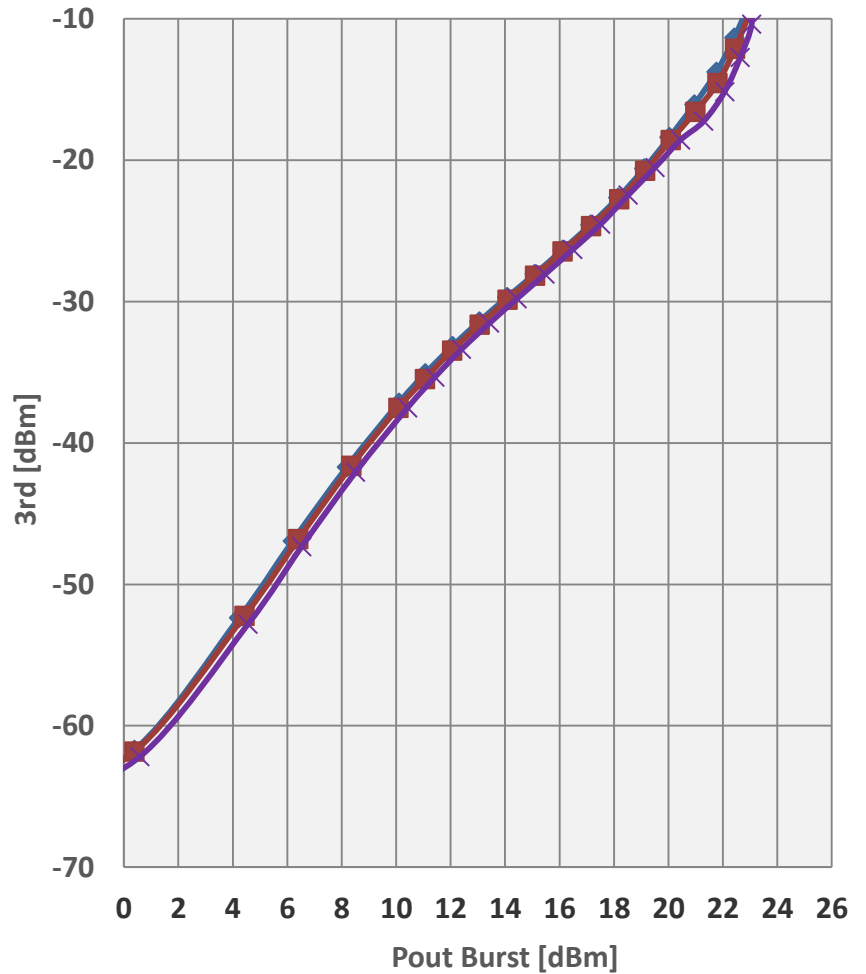
# RFX8422S CW Harmonics over Frequency

VDD = 3.3V

## 2nd Harmonic



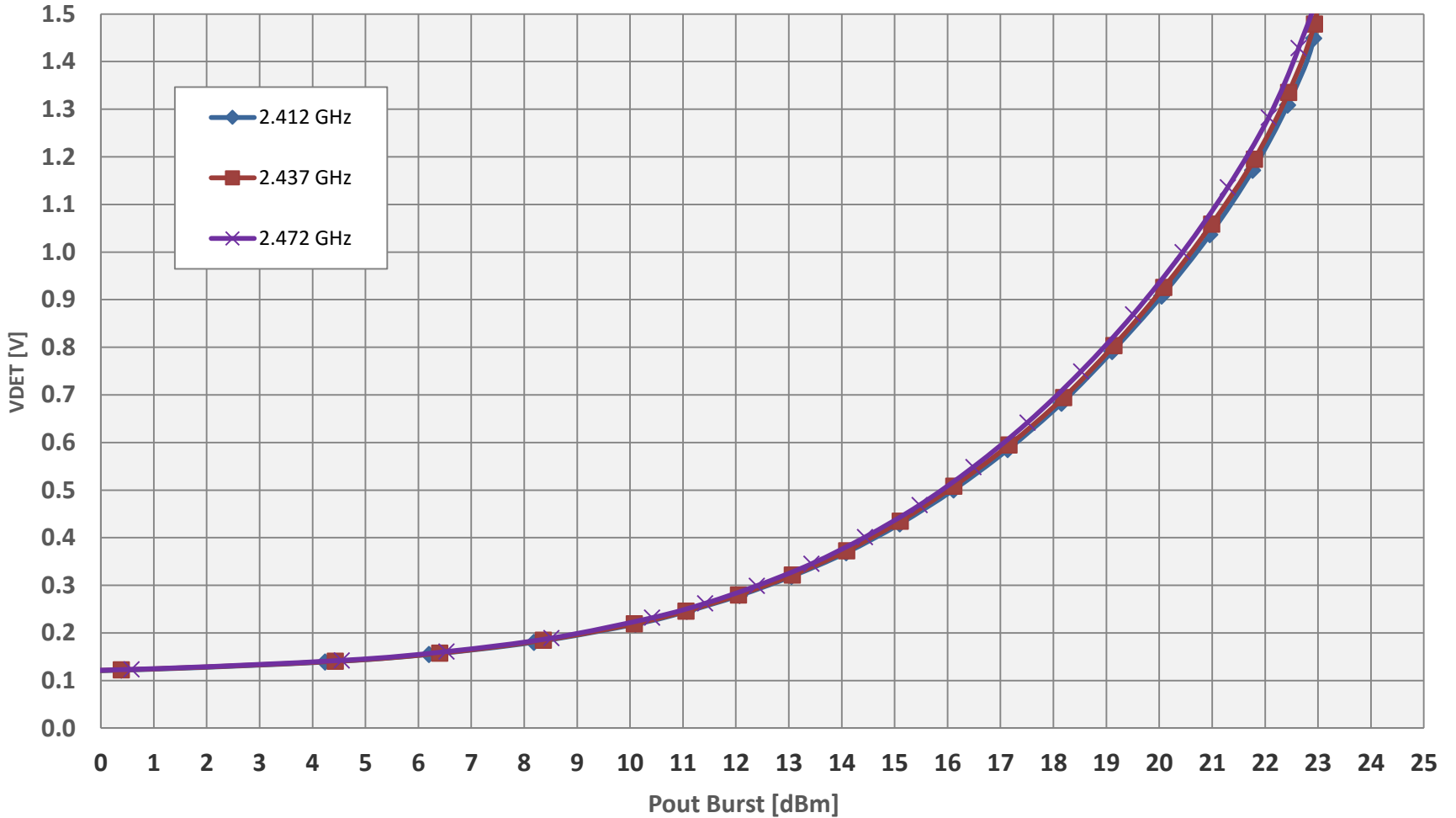
## 3rd Harmonic



# RFX8422S CW Power Detector over Frequency

## VDD = 3.3V

Vdet VDD = 3.3V

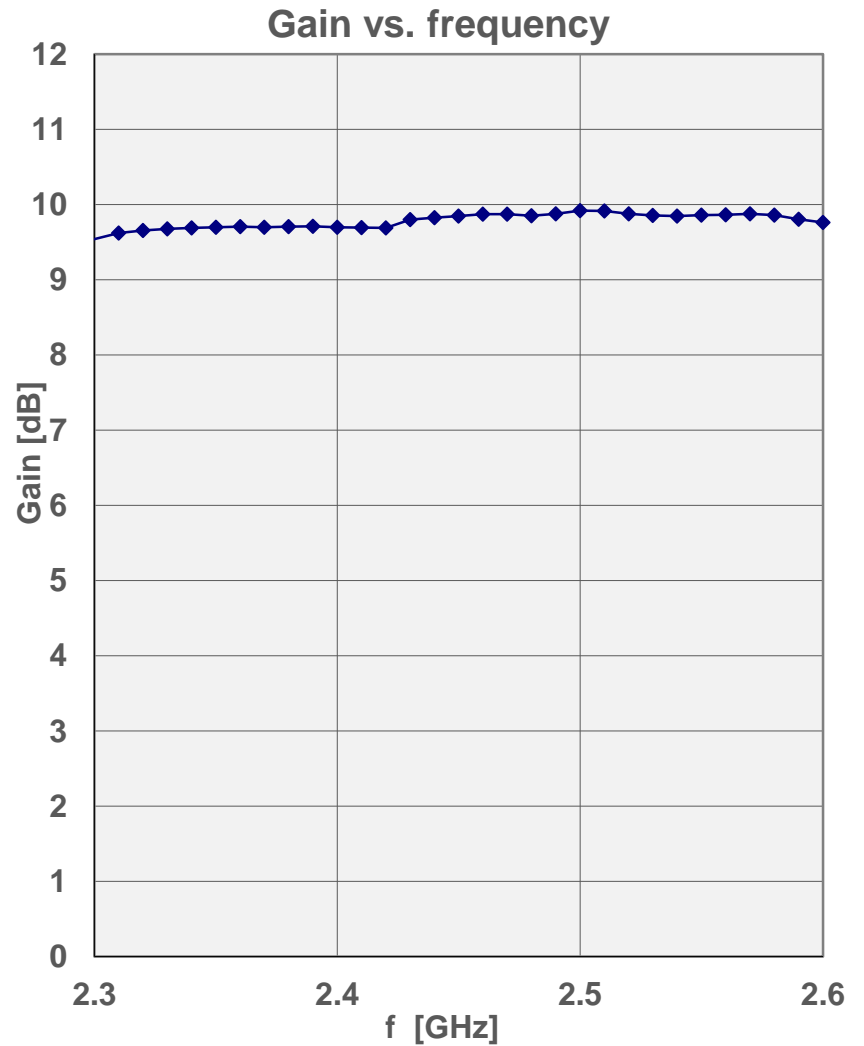
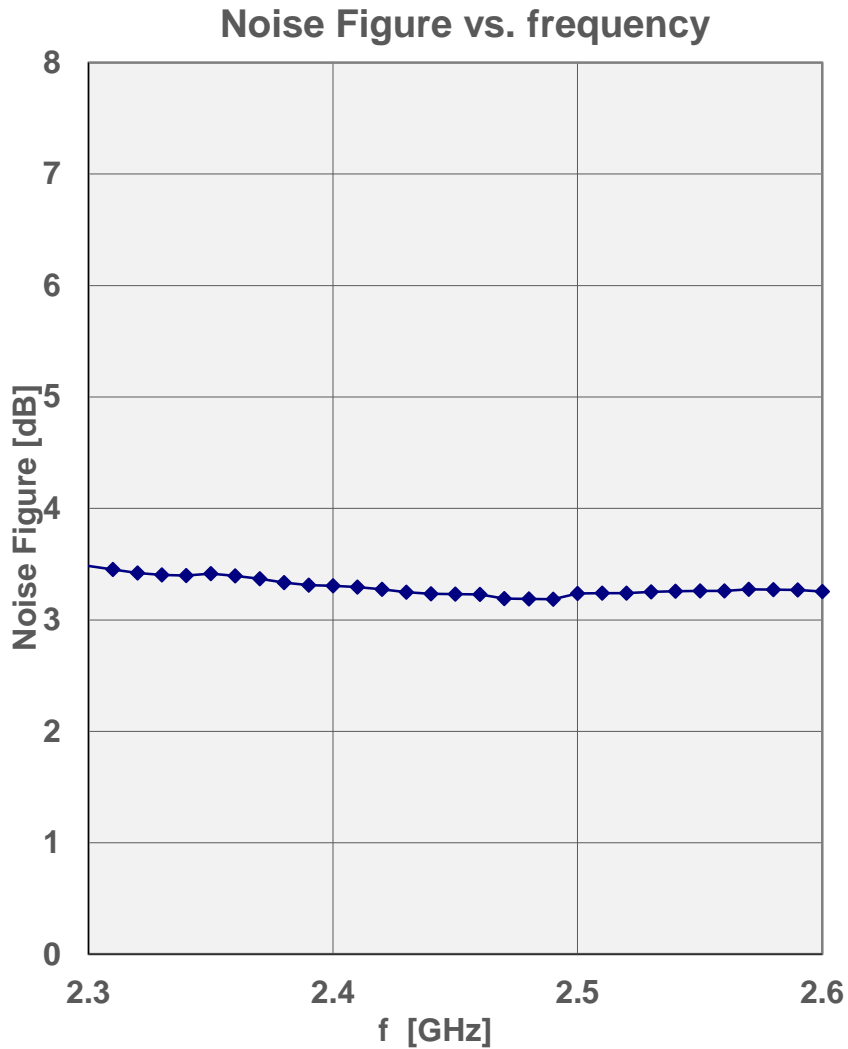


Detector voltage measured with 10kΩ load. Detector voltage will vary with different resistor load values.



# RFX8422S LNA Gain and Noise Figure vs. Frequency

VDD = 3.3V



RXEN=High, LEN=High, TXEN=BTEN=Low, Iq= 11 mA



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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