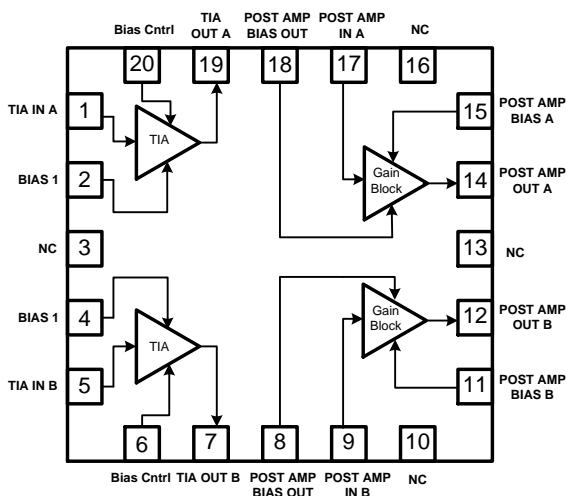


# RFRX8888

## xPON Video Receiver

The RFRX8888 is a video receiver integrated circuit (IC) which provides a low noise analog interface to optical access triplexer modules used in single family ONTs in fiber to the premise (FTTP) applications. The RFRX8888 exhibits low input noise and distortion to meet critical FTTP link requirements. RFRX8888, with recommended external control circuitry, provides automatic gain control to maintain a constant +19 to +23dBmV/channel output to insure consistent video quality. It runs on a single 12V supply eliminating the need for an extra ONT supply.



Functional Block Diagram



Package: QFN, 20-pin,  
4.0mm x 4.0mm x 0.85mm

### Features

- +12V Single Supply Operation
- +5V Configuration Optional
- Efficient Power Consumption 1.3W for 12V
- Low Noise 3.2pA/√Hz Equivalent Input Noise Current (EINC)
- Linearity -61dBc CSO and -64dBc CTB at +23dBmV RF Output per Channel (79-NTSC Equivalent Channels)
- 45MHz to 1200MHz Operational Bandwidth
- 27dB AGC Range with Recommended External Control Circuitry
- Best-in-Class +23dBmV per Channel RF Output Capability

### Applications

- xPON RF Overlay Video Receiver for FTTH Triplexer-Equipped Optical Network Termination (ONT) and RFoG Network Interface Unit (NIU)

### Ordering Information

RFRX8888SQ	Sample bag with 25 pieces
RFRX8888SR	7" Reel with 100 pieces
RFRX8888TR13	13" Reel with 2500 pieces
RFRX8888PCK-410	45MHz to 1200MHz PCBA with 5-piece sample bag

## Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage ( $V_{DD}$ )	15	V
Storage Temperature Range	-40 to +150	°C
ESD Rating – HBM	Class 1A	V
ESD Rating – CDM	Class C3	V
Moisture Sensitivity Level	MSL1	



**Caution!** ESD sensitive device.



RFMD Green: RoHS status based on EU Directive 2011/65/EU (at time of this document revision), halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

## Recommended Operating Condition

Parameter	Specification			Unit
	Min	Typ	Max	
Operating Temperature Range	-40		+85	°C
Operating Junction Temperature			160	°C
RF Power Supply Voltage <sup>1</sup>	11.4	12	12.6	V

Note 1: With the use of 19.5Ω of resistance from  $V_{DD}$  to pins 12 and 14

## Nominal Operating Parameters

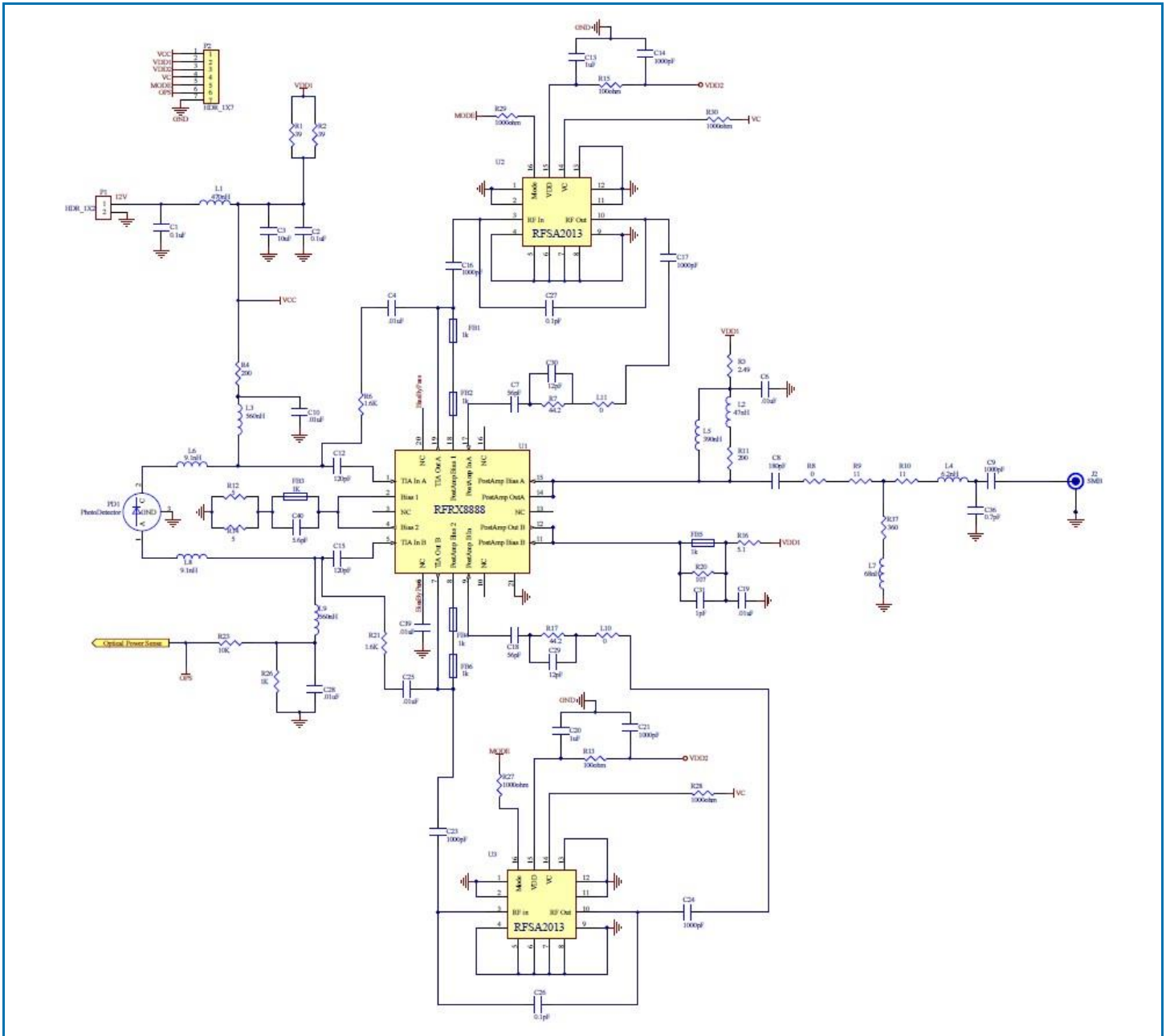
Parameter	Specification			Unit	Condition
	Min	Typ	Max		
<b>General Performance</b>					<b>Test Conditions: <math>T_A = 25^\circ\text{C}</math>, <math>V_{DD} = 12\text{V}</math>, unless otherwise specified</b>
Bandwidth	45		1200	MHz	
RF Gain at 553.25MHz		37.5		dB	Gain – 20 * log(X/75); higher gain configurations available
Gain Flatness		1.5		+/-dB	
Tilt		3		dB	Linear tilt from 45MHz to 1200MHz; higher tilt can be achieved by changing component
Equivalent Input Noise		3.2		pA/√Hz	
RF Output Level at 547.25MHz		22	24	dBmV/ch	AGC using 2.82%/Channel; output level can be fixed by external or internal AGC
Output Return Loss		-17		dB	At 50MHz
		-18		dB	At 600MHz
		-15		dB	At 1200MHz
CSO		-65		dBc	79-NTSC Equivalent analog channels, +2dBm optical input OMI = 2.82%/ch; $RF_{OUT} = +22\text{dBmV}$ per channel at 547.25MHz (measured with complete evaluation board circuit in operation including PD and external AGC circuit)

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
<b>General Performance</b>					<b>Test Conditions: <math>T_A = 25^\circ\text{C}</math>, <math>V_{DD} = 12\text{V}</math>, unless otherwise specified</b>
CTB		-66		dBc	79-NTSC Equivalent analog channels, +2dBm optical input OMI = 2.82%/ch; $\text{RF}_{\text{OUT}} = +22\text{dBmV}$ per channel at 547.25MHz (measured with complete evaluation board circuit in operation including PD and external AGC circuit)
Gain Control Range		27		dB	Using suggested application circuit
Supply Current		130		mA	
Thermal Resistance		45.4		$^\circ\text{C/W}$	$T_{\text{REF}}$ taken at $85^\circ\text{C}$ from backside of PCB under the RFRX8888

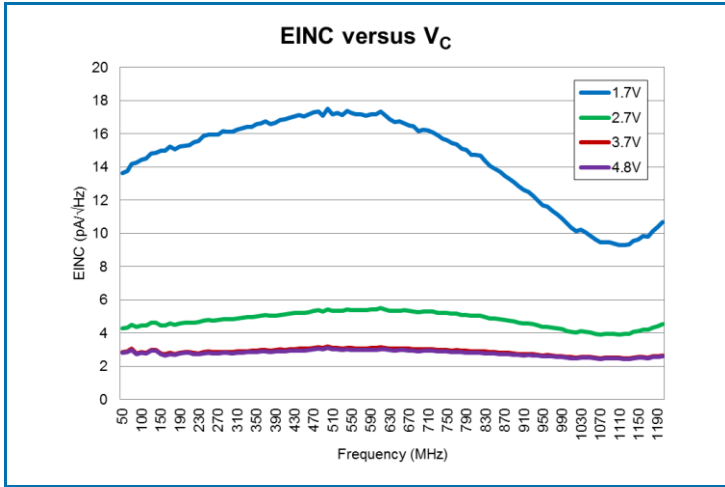
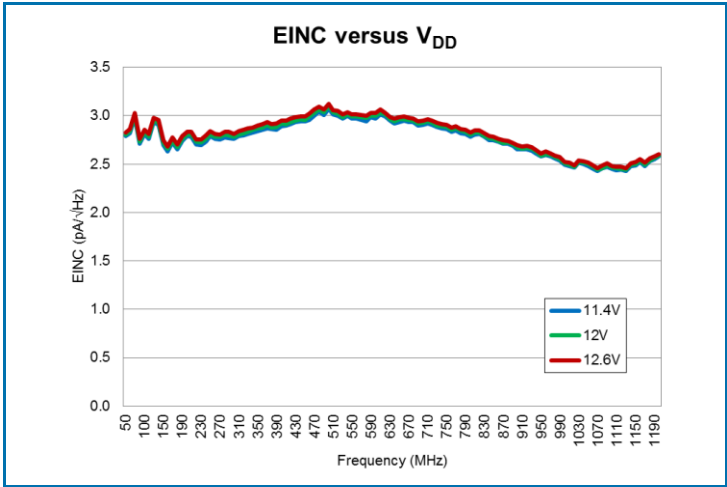
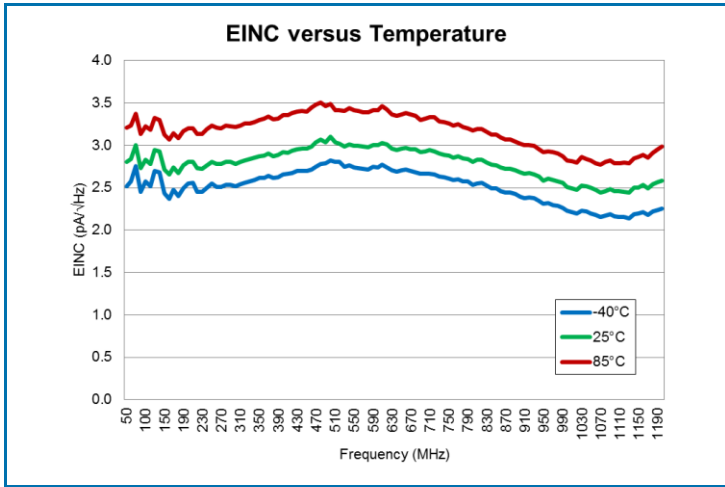
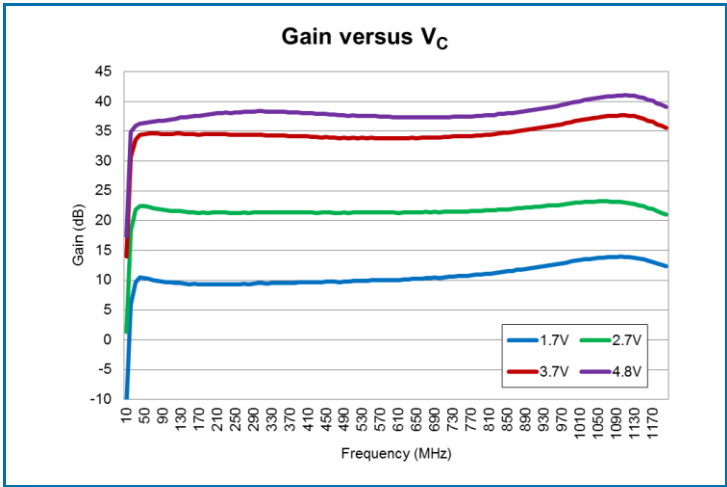
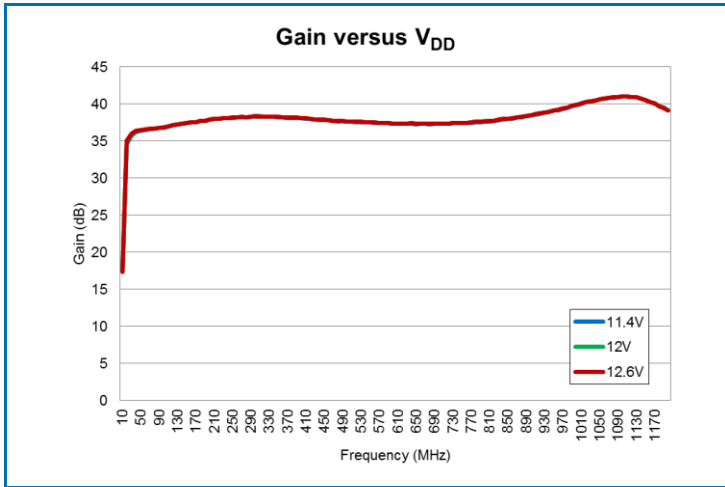
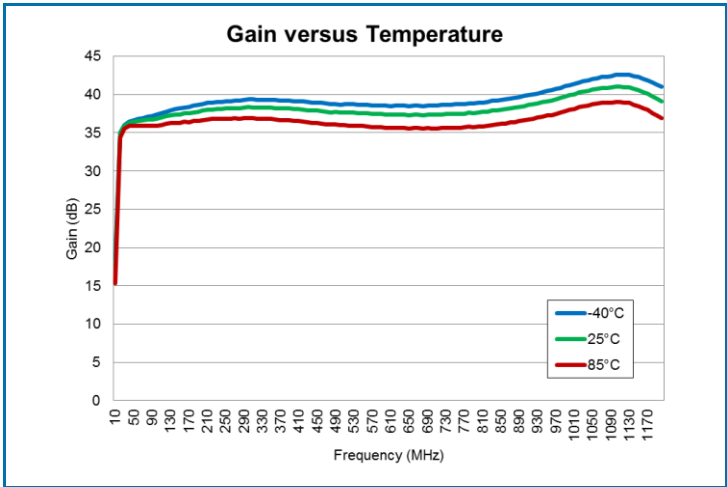
## Optical Input Requirements

Parameter	Unit	Min	Typical	Max
Optical Input Power	dBm	-10		2
Optical Modulation Index (OMI)	%/ch (79ch)		3	
Triplexer 1550nm PIN Responsivity	mA/mW		0.95	
Triplexer 1550nm PIN Capacitance	pF		0.5	

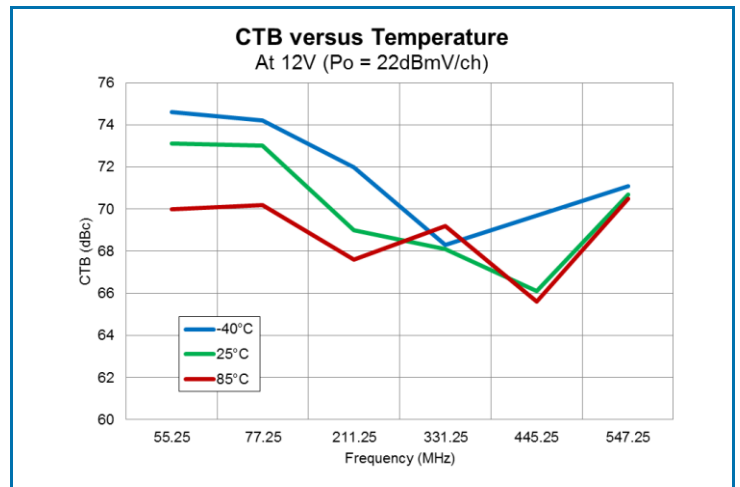
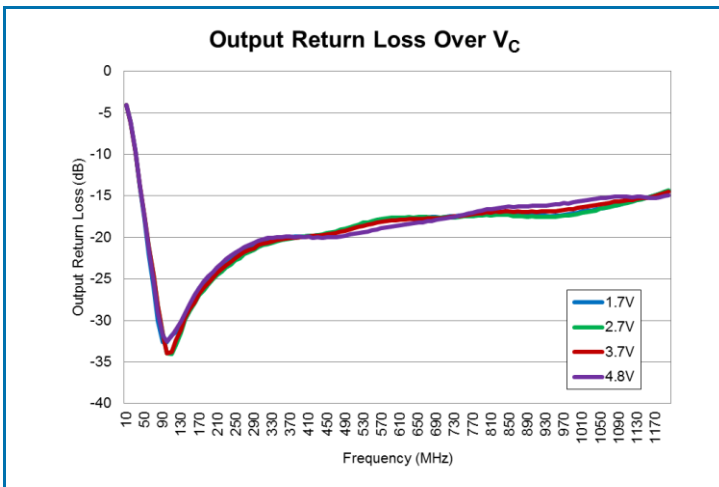
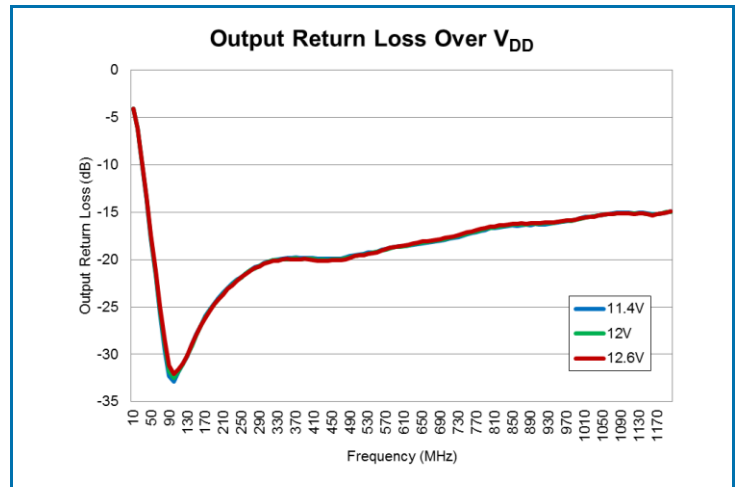
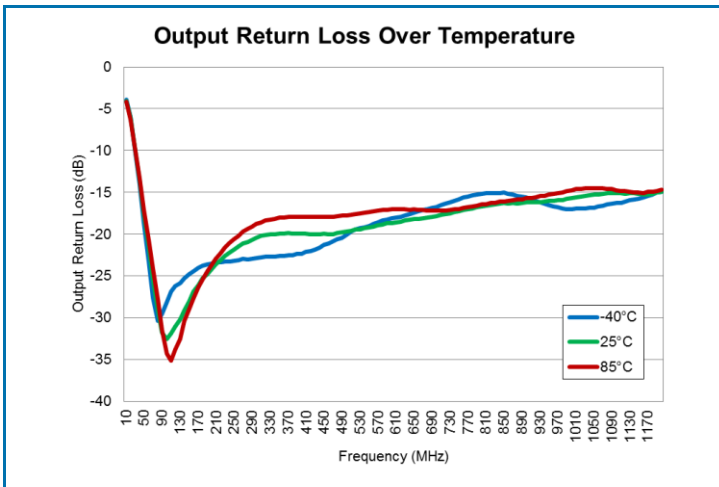
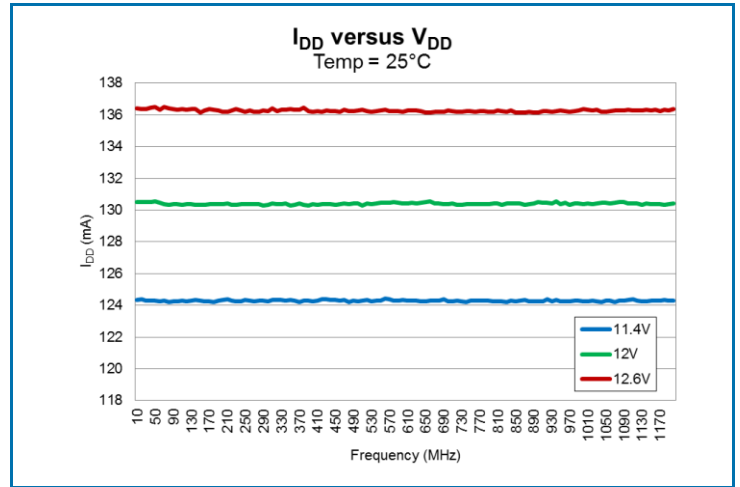
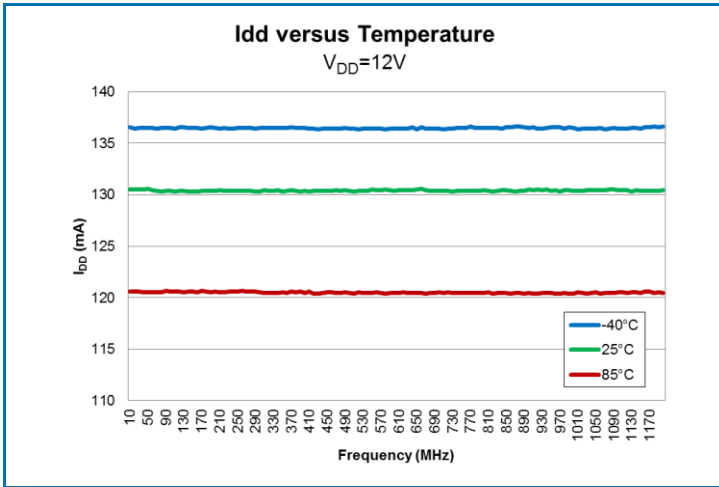
Typical Application Schematic 3dB Tilt, 45MHz to 1200MHz Application Circuit



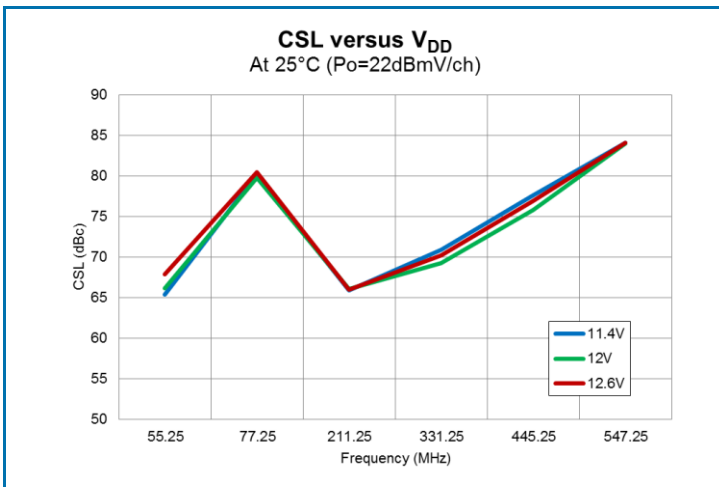
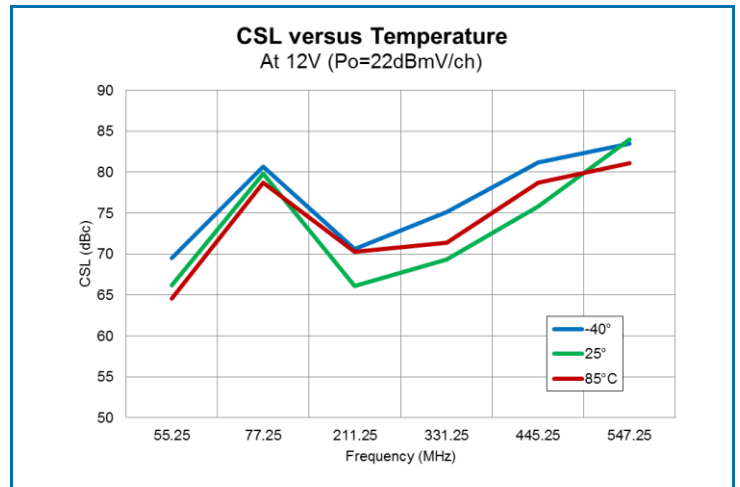
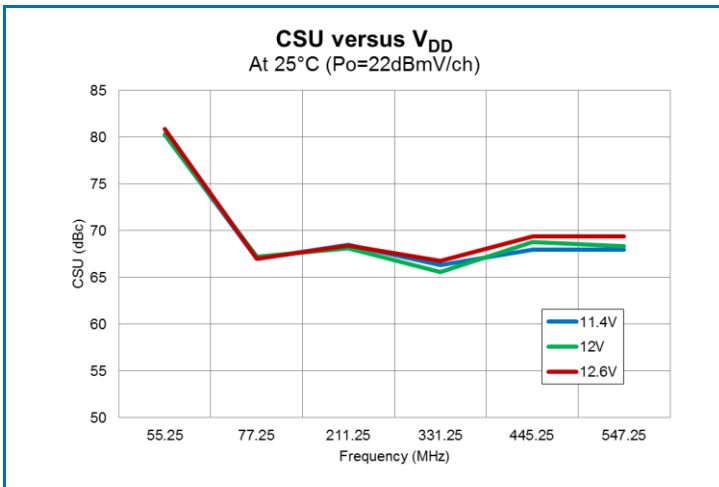
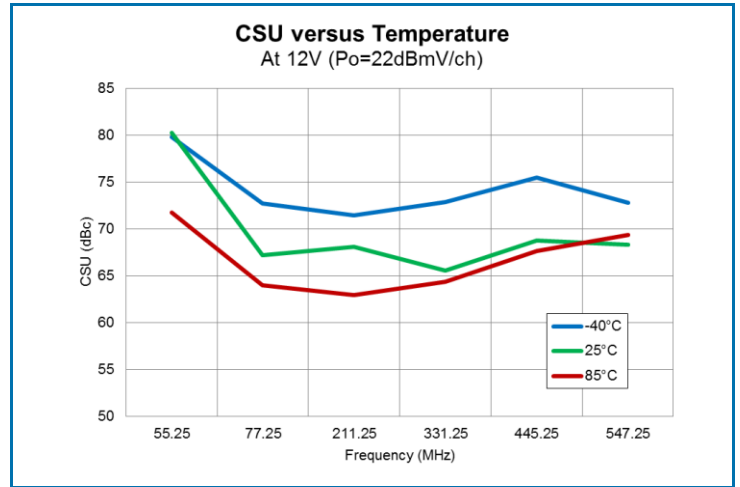
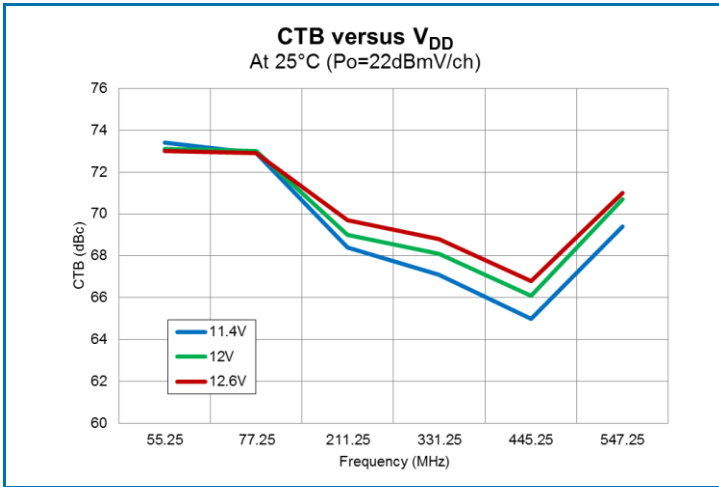
Typical Performance:  $T = 25^{\circ}\text{C}$ ,  $V_{\text{DD}} = 12\text{V}$  unless otherwise noted



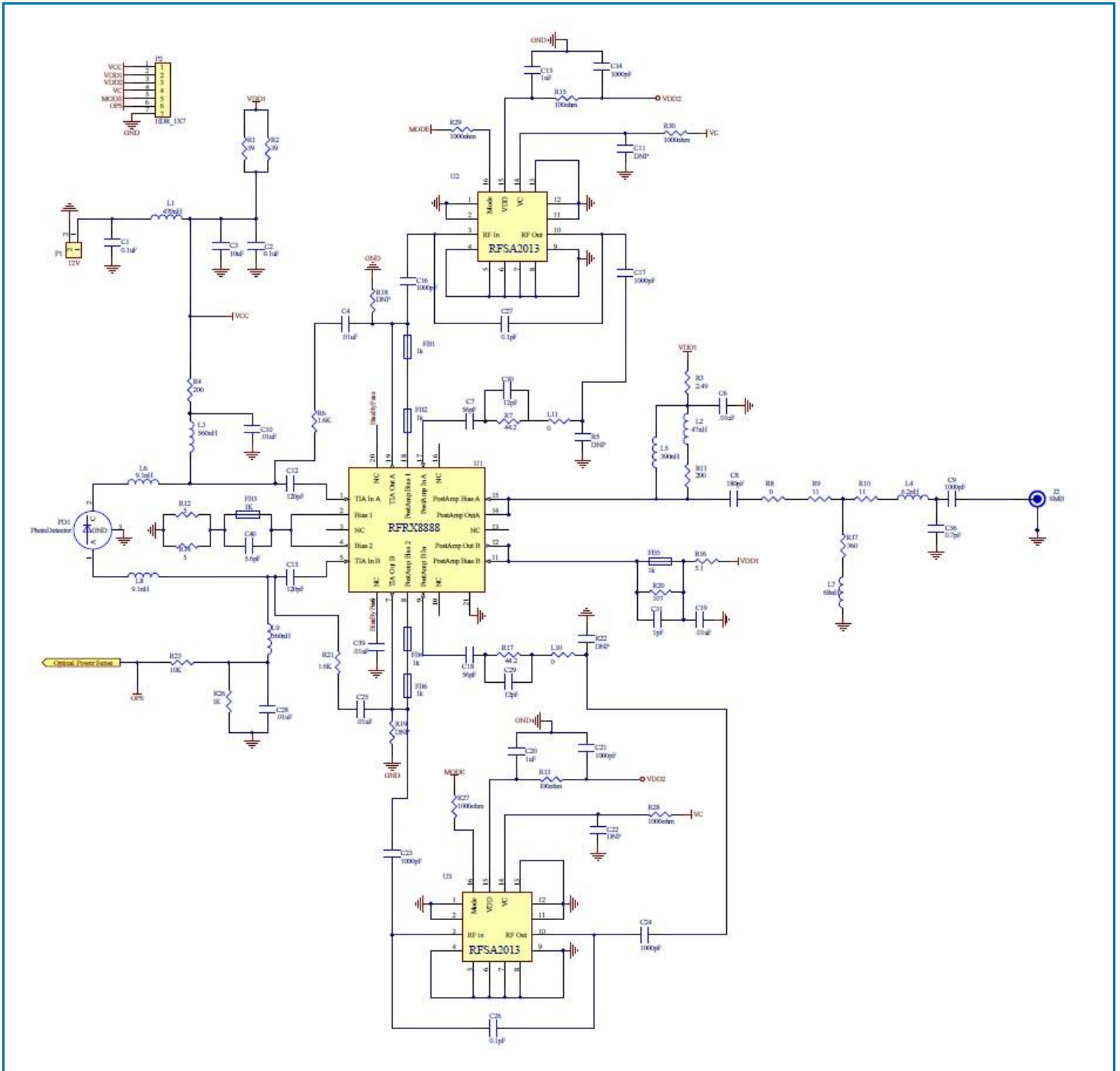
Typical Performance: T = 25°C, V<sub>DD</sub> = 12V unless otherwise noted



Typical Performance: T = 25°C, V<sub>DD</sub> = 12V unless otherwise noted



Evaluation Board Schematic 3dB Tilt, 45MHz to 1200MHz Application Circuit



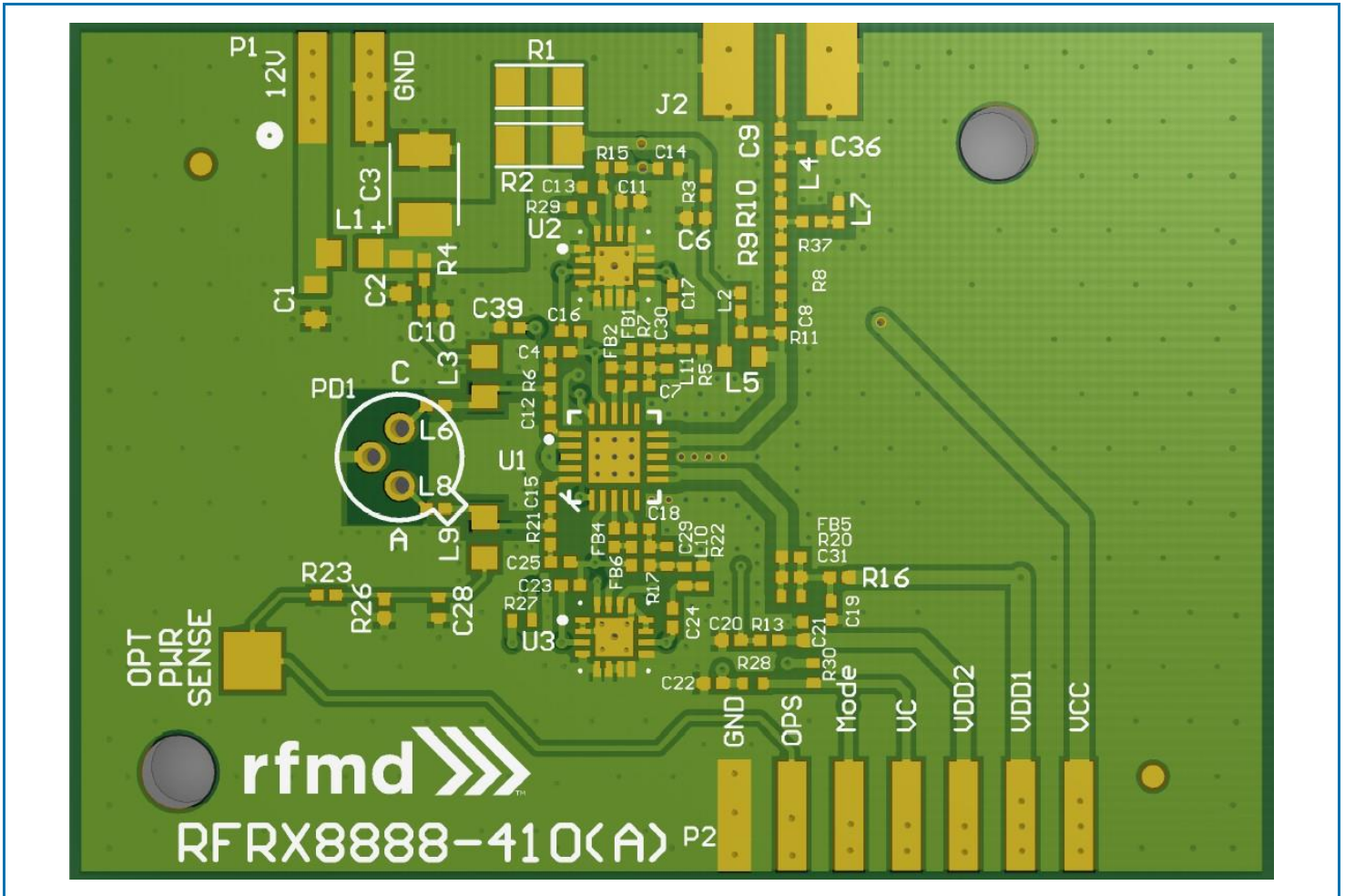


## Evaluation Board Bill of Materials (BOM) 3dB Tilt, 45MHz to 1200MHz Application Circuit

Description	Reference Designator	Manufacturer	Manufacturer's P/N
RFRX8888-410(A)	PCB Itself	Viasystems	RFRX8888-410(A)
RFRX8888 (FTTP) Video Receiver	U1	RFMD	RFRX8888
50MHz to 4000MHz 5V SOI VCA	U2-U3	RFMD	RFS2013
FER, BEAD, 1K, 50mA, 0402	FB1-FB6	Murata Electronics	BLM15AG102SN1D
CAP, 0.1 $\mu$ F, 10%, 16V, X7R, 0603	C1-C2	Murata Electronics	GRM188R71C104KA01D
CAP, 10 $\mu$ F, 10%, 16V, TANT-B	C3	AVX / Kycera Asia Ltd.	TAJB106K016R
CAP, 10000pF, 10%, 25V, X7R, 0402	C4, C6, C10, C19, C25, C28, C39	Murata Electronics	GRM155R71E103KA01D
CAP, 56pF, 5%, 50V, C0G, 0402	C7, C18	Murata Electronics	GRM1555C1H560JA01D
CAP, 180pF, 5%, 50V, C0G, 0402	C8	Murata Electronics	GRM1555C1H181JA01D
CAP, 1000pF, 10%, 50V, X7R, 0402	C9, C14, C16-C17, C21, C23-C24	Murata Electronics	GRM155R71H102KA01D
CAP, 120pF, 5%, 50V, C0G, 0402	C12, C15	Murata Electronics	GRM1555C1H121JA01D
CAP, 1 $\mu$ F, 10%, 10V, X5R, 0402	C13, C20	Murata Electronics	GRM155R61A105KE15D
CAP, 0.1pF, +/-0.05pF, 50V, HI-Q, 0402	C26-C27	Murata Electronics	GJM1555C1HR10WB01D
CAP, 12pF, 5%, 50V, C0G, 0402	C29-C30	Murata Electronics	GRM1555C1H120JA01D
CAP, 0.7pF, +/-0.1pF, 50V, HI-Q, 0402	C36	Murata Electronics	GJM1555C1HR70BB01D
CAP, 5.6pF, +/-0.25pF, 50V, HI-Q, 0402	C40	Murata Electronics	GJM1555C1H5R6CB01D
RES, 39 $\Omega$ , 1%, 1/4W, 1206	R1-R2	Panasonic Industrial Devices Sales	ERJ-8ENF39R0V
RES, 2.49 $\Omega$ , 1%, 1/16W, 0402	R3	Kamaya, Inc.	RMC1/16S-2R49FTH
RES, 200 $\Omega$ , 1%, 1/16W, 0402	R4, R11	Kamaya, Inc.	RMC1/16SK2000FTH
RES, 1.6K $\Omega$ , 1%, 1/16W, 0402	R6, R21	Kamaya, Inc.	RMC1/16SK1601FTH
RES, 44.2 $\Omega$ , 1%, 1/16W, 0402	R7, R17	Kamaya, Inc.	RMC1/16SK44R2FTH
RES, 0 $\Omega$ , 0402	R8, L10-L11	Kamaya, Inc.	RMC1/16SJPTH
RES, 11 $\Omega$ , 1%, 1/10W, 0402	R9-R10	Panasonic Industrial Devices Sales	ERJ-2RKF11R0X
RES, 4.99 $\Omega$ , 1/2W 1% 1206 SMD	R12, R14	Vishay Dale	CRCW12064R99FKEAHP
RES, 100 $\Omega$ , 1%, 1/16W, 0402	R13, R15	Kamaya, Inc.	RMC1/16SK1000FTH
RES, 5.1 $\Omega$ , 1%, 1/16W, 0402	R16	Kamaya, Inc.	RMC1/16S-5R10FTH
RES, 10K, 1%, 1/16W, 0402	R23	Kamaya, Inc.	RMC1/16SK1002FTH
RES, 107 $\Omega$ , 1%, 1/16W, 0402	R20	Kamaya, Inc.	RMC1/16SK1070FTH
RES, 1K, 1%, 1/16W, 0402	R26, R27, R28, R29, R30	Kamaya, Inc.	RMC1/16SK1001FTH
RES, 360 $\Omega$ , 1%, 1/16W, 0402	R37	Kamaya, Inc.	RMC1/16SK3600FTH
IND, 470nH, 10%, W/W, 0805	L1	Coilcraft, Inc.	0805CS-471XJLB
IND, 47nH, 5%, M/L, 0402	L2	Murata Electronics	LQG15HN68NJ02D
IND, 560nH, 10%, W/W, 0805	L3, L9	Coilcraft, Inc.	0805CS-561XJLB
IND, 6.2nH, +/-0.1nH, T/F, 0402	L4	Murata Electronics	LQP15MN6N2B02D

Description	Reference Designator	Manufacturer	Manufacturer's P/N
IND, 390nH, 0603 WW, ROHS	L5	Coilcraft, Inc.	0603CS-R39XJLW
IND, 68nH, 5%, W/W, 0402	L7	Coilcraft, Inc.	0402CS-68NXJLW
IND, 9.1nH, +/-0.1nH, T/F, 0402	L6, L8	Murata Electronics	LQP15MN9N1B02D
CONN, HDR, ST, PLRZD, 2-PIN, 0.100"	P1	ITW Pancon	MPSS100-2-C
CONN, HDR, ST, PLRZD, 7-PIN, 0.100"	P2	ITW Pancon	MPSS100-7-C
CONN, SMB, END LNCH, 75 OHM, MINI, 0.062"	J2	Samtec Inc.	SMB7H-J-P-H-ST-EM1
PINDiode/PDS123-CSA-C0106pigtail 976/SC (Note 6)	PD1	SWT	PDS123-CSA-C0106
DNP	C11, C22, R5, R18-R19, R22	NA	NA

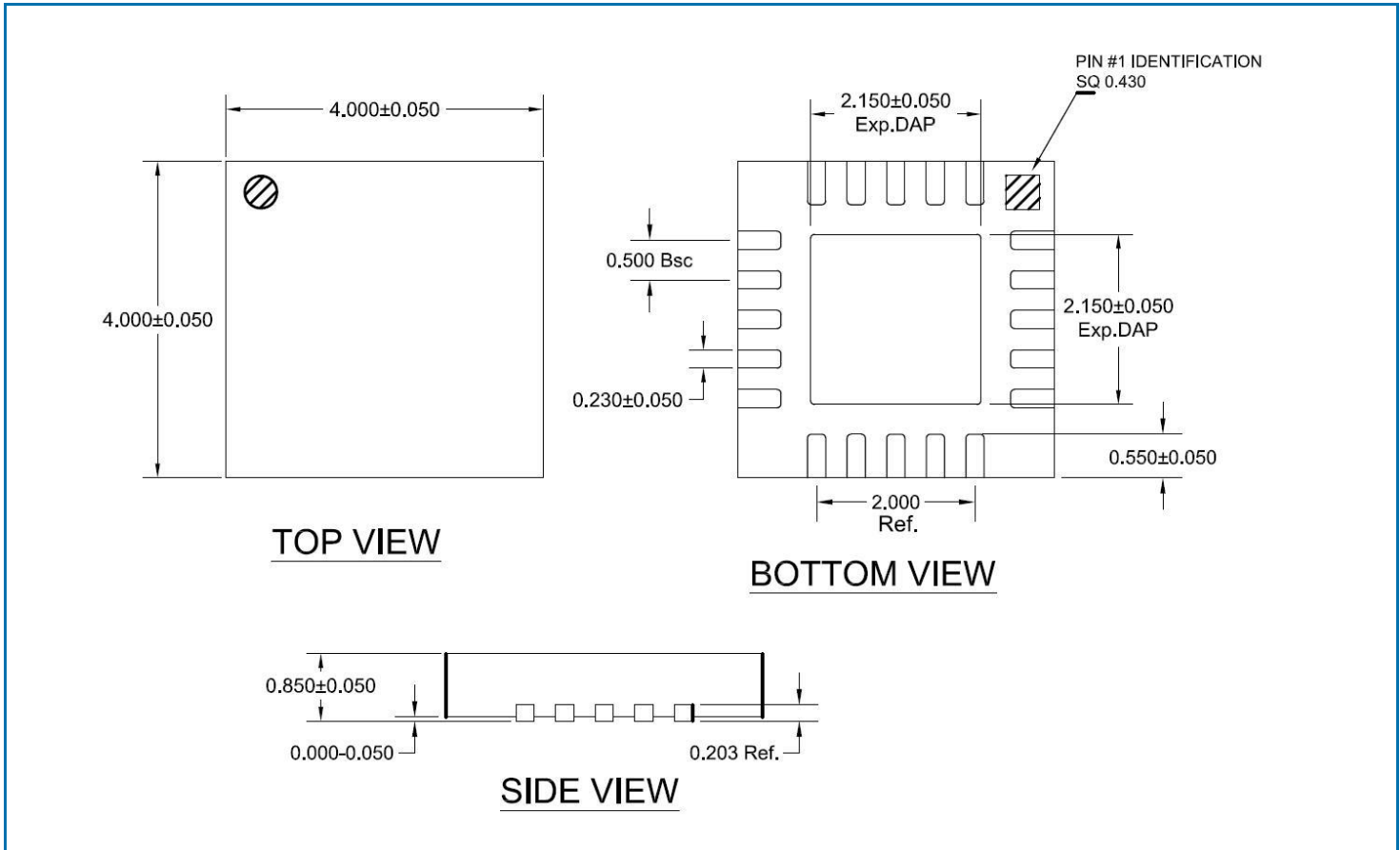
Evaluation Board Assembly Drawing 3dB Tilt, 45MHz to 1200MHz Application Circuit



## Pin Names and Descriptions

Pin	Name	Description
1	TIA INPUT A	Input to the TIA stage of the receiver
2	BIAS1	Biassing for the first stage. The current flowing through this pin is used to control the biasing for the first stage amplifier
3	NC	Not Connected
4	BIAS1	Biassing for the first stage. The current flowing through this pin is used to control the biasing for the first stage amplifier
5	TIA INPUT B	Input to the TIA stage of the receiver
6	BIAS CONTRL	Bias Control pin not used for normal operation. A 0.1 $\mu$ F capacitor is connected to these pins for filtering
7	TIA OUT B	Output of the first stage TIA
8	Post AMP BIAS	Bias input for the second stage amplifier (post amp)
9	Post AMP IN B	Input for the second stage amplifier (post amp)
10	NC	Not Connected
11	Post AMP BIAS B	Biassing for the second stage amplifier (post amp)
12	Post AMP OUT B	Output of the second stage amplifier (post amp)
13	NC	Not Connected
14	Post AMP OUT A	Output of the second stage amplifier (post amp)
15	Post AMP BIAS A	Biassing for the second stage amplifier (post amp)
16	NC	Not Connected
17	Post AMP IN A	Input for the second stage amplifier (post amp)
18	Post AMP BIAS	Bias input for the second stage amplifier (post amp)
19	TIA OUT A	Output of the first stage TIA
20	BIAS CONTRL	Bias Control pin not used for normal operation. A 0.1 $\mu$ F capacitor is connected to these pins for filtering

Package Outline (Dimensions in millimeters)



### Branding Diagram

