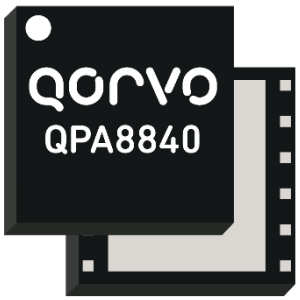
QPA8840

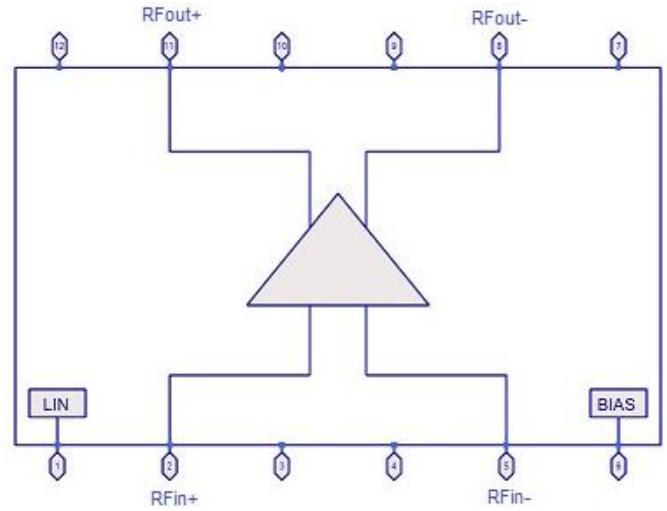
75 Ω 22dB CATV Amplifier (50 – 1800 MHz)

Product Overview

The QPA8840 is a an ultra-linear, 22dB Gain, GaAs amplifier, intended for mid or output stage amplification in CATV infrastructure applications. The QPA8840 operates off a 12 Volt, 425 mA supply. The device features a push-pull cascode design which provides flat gain along with ultra-low distortion from 50MHz to 1.8GHz.



Functional Block Diagram



12-Pin 6x6 mm² Laminate Module

Key Features

- 50 MHz to 1800 MHz Operation
- 12 V Operation
- Gain: 22 dB Typical
- Noise Figure: 4.2 dB
- RoHS Compliant

Applications

- DOCSIS 4.0 Amplifiers
- DOCSIS 4.0 Optical Nodes
- Broadband Hybrid CATV Modules

Ordering Information

Part Number	Description
QPA8840EVB-01	Evaluation Board
QPA8840SB	Sample bag with 5 pieces
QPA8840SR	7” Reel with 100 pieces
QPA8840TR13	13” Reel with 2500 pieces

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage (V_{DD})	+16V
Supply Current (I_{DD})	550 mA
Maximum Input Level	+70 dBmV
Operating Temperature Range	-40 to +100 °C
Storage Temperature Range	−65 to +150 °C
Maximum Junction Temperature	+150 °C

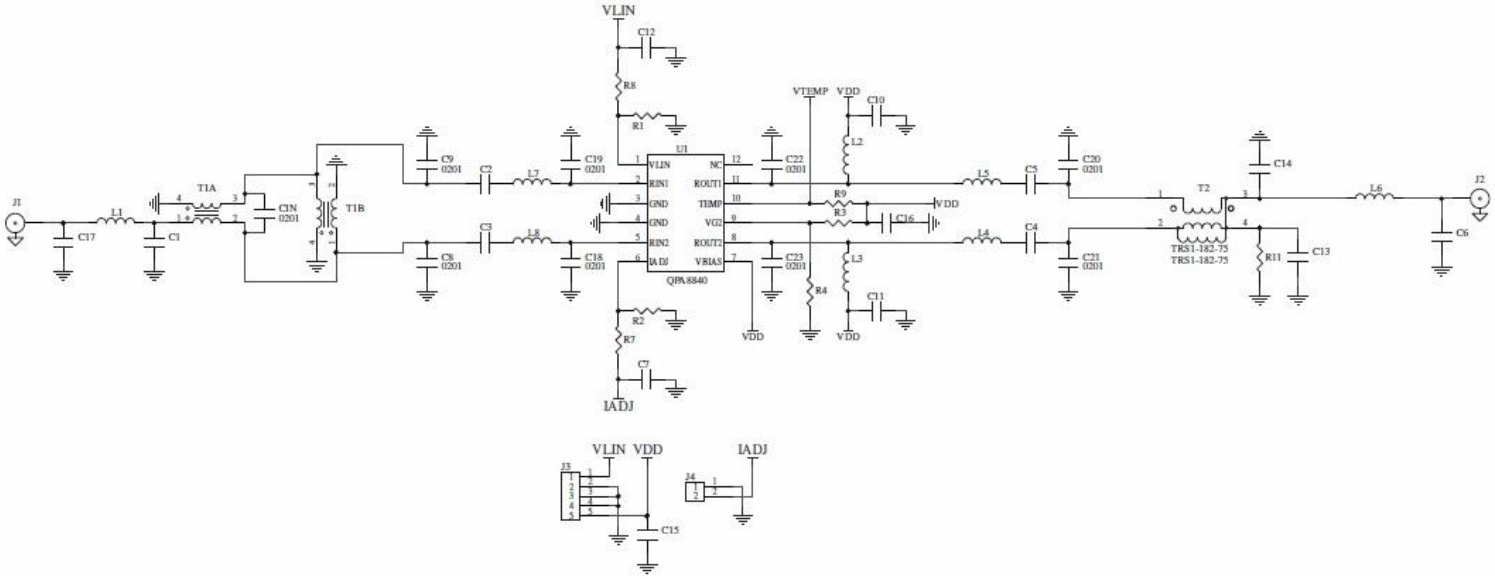
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application o
Absolute Maximum Rating conditions to the device may reduce device reliability.

Electrical Specifications at 12 V

Parameter	Condition [1]	Min	Typ	Max	Unit
Supply Voltage (V_{DD})			12		V
Supply Current (I_{DD})			425		mA
Frequency Range		50		1800	MHz
Gain			22		dB
Gain Slope			1		dB
Reverse Isolation			25		dB
Input Return Loss			20		dB
Output Return Loss			20		dB
MER	At +69dBmV Total Composite Output power. 108MHz to 1791MHz, 20dB tilt, 280 Ch. SC-QAM		42		dB
Noise Figure	Full Band		4.2		dB
OIP2L	Full Band, 15 dBm / tone output		84		dBm
OIP2U	Full Band, 15 dBm / tone output		75		dBm
OIP3	Full Band, 15 dBm / tone output		41		dBm
OP1dB			30		dBm
Thermal Resistance	Θ_{JC}		8		˚C/W

Note: Typical performance at these conditions: Temp = +25 °C, V_{DD} = +12V, 75 Ω system, Full band unless otherwise noted

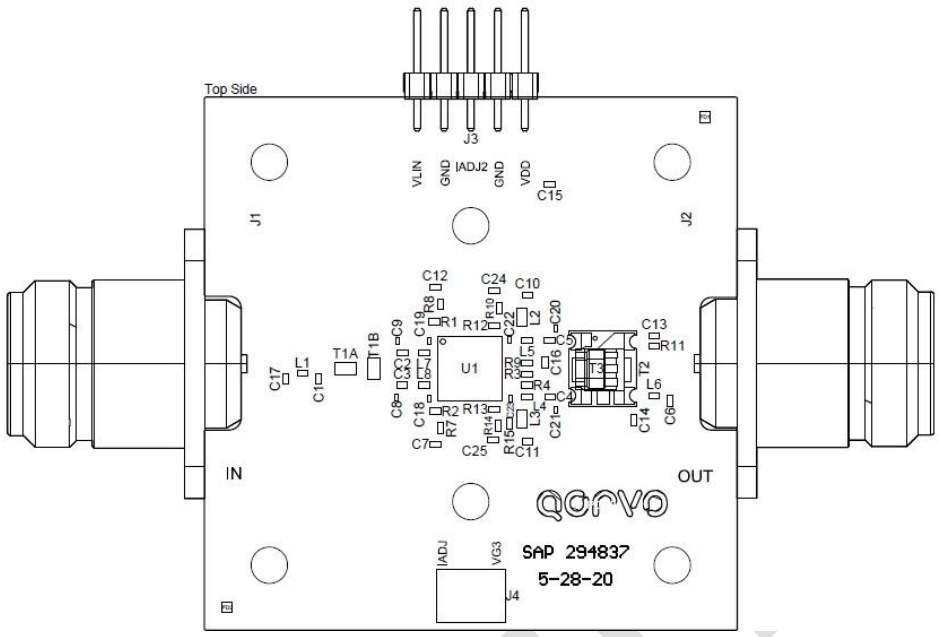
Evaluation Board Schematic 50 MHz – 1800 MHz

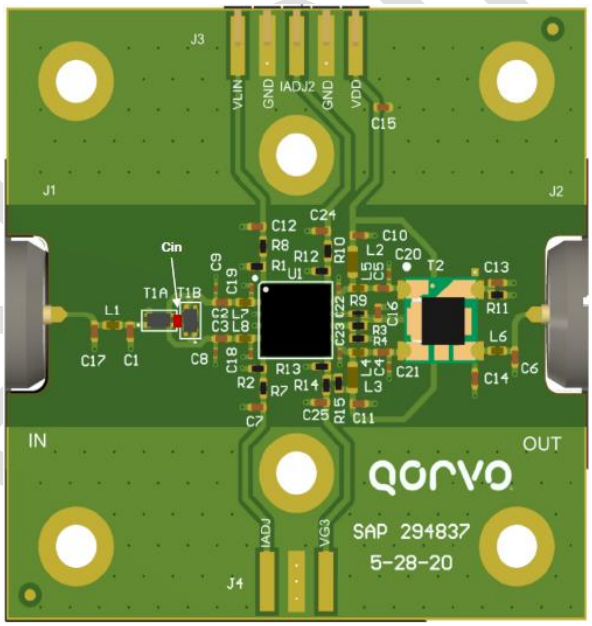


Evaluation Board Bill of Materials

Component	Value	Part #	Manufacturer	Component	Value	Part #	Manufacturer
R1	2.7k			C13, L7, L8, L4, L5, R11	0 Ohm		
R2, R8	1.2k			L6	1.3nH		
R7	20k			T1A, T1B	1:1	DXW21BN7511S#	Murata
R4	1.5k			T2	1:1	TRS1-182-75+	Mini-Circuits
R3	5.6k			J1, J2			
C2, C3	1000pF			J3, J4			
C7, C10, C11, C15, C24	0.01uF			R9, R10, R13, R14, R15, R12, C6, C12, C14, C16, C17, C18, C19, C22, C23, C25	DNP		
C1, C20, C21	0.5pF			U1		QPA8840	Qorvo
Cin	0.6pF						
C8, C9	0.7pF						
C4, C5	470pF						
L1	2.7nH						
L2, L3	470nH						

Evaluation Board Assembly Drawing





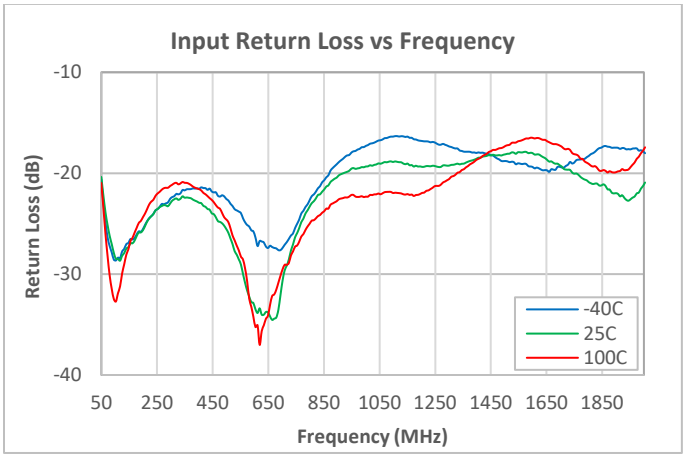
QPA8840 Evaluation Board

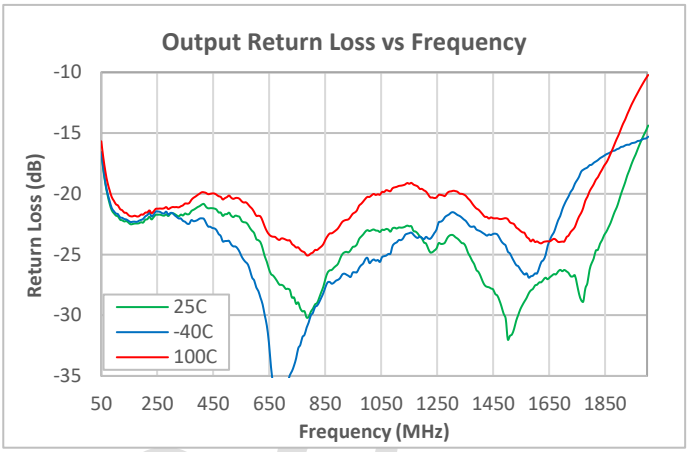
LAYER STACK LEGEND

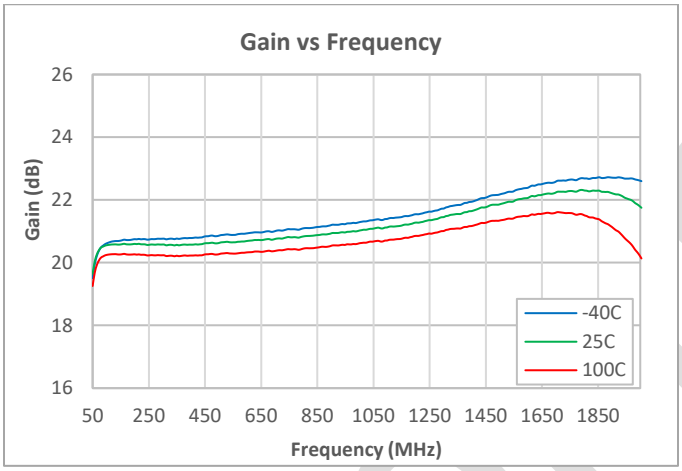
Material	Layer	Thickness	Dielectric Material	Type	Comment
	Top Overlay			Legend	HIGH TEMPERATURE, NON-CONDUCTIVE, WHITE EPOXY BASED INK.
Surface Material	Top Solder	0.0004in	SM-001	Solder Mask	LPI (LIQUID PHOTO-IMAGEABLE), OR LDI (LASER DIRECT IMAGEABLE), GREEN.
CF-004	Top Layer	0.0014in		Signal	
Core		*0.0200in*	*RO4003*	*Dielectric*	
CF-004	Bottom Layer	0.0014in		Signal	

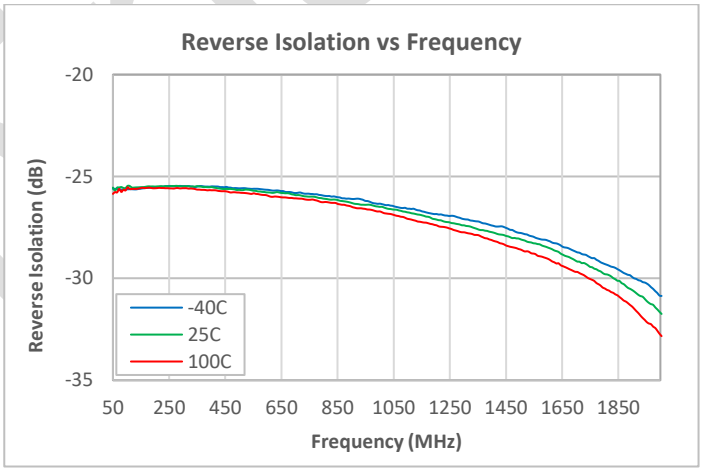
Finished board thickness: 0.0232

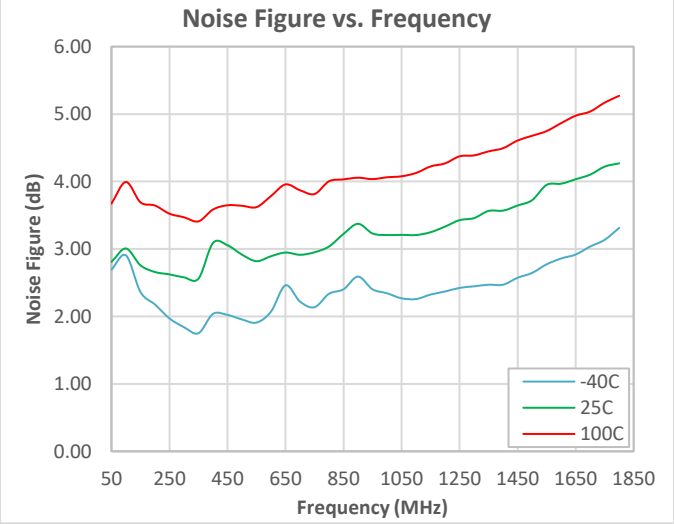
Performance Data











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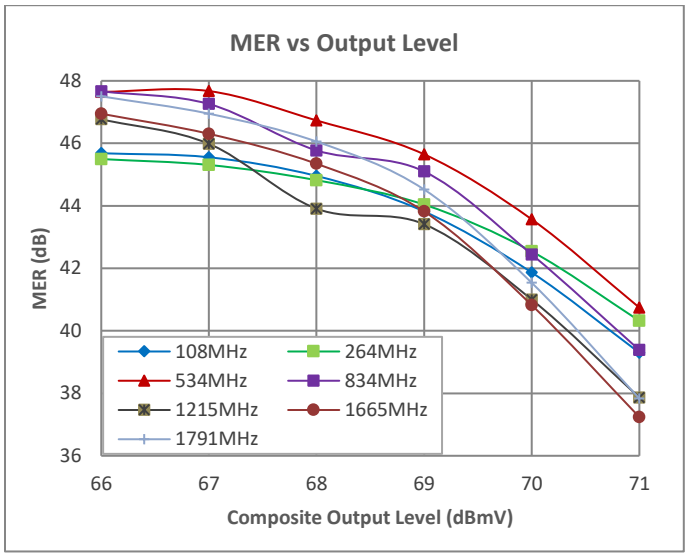
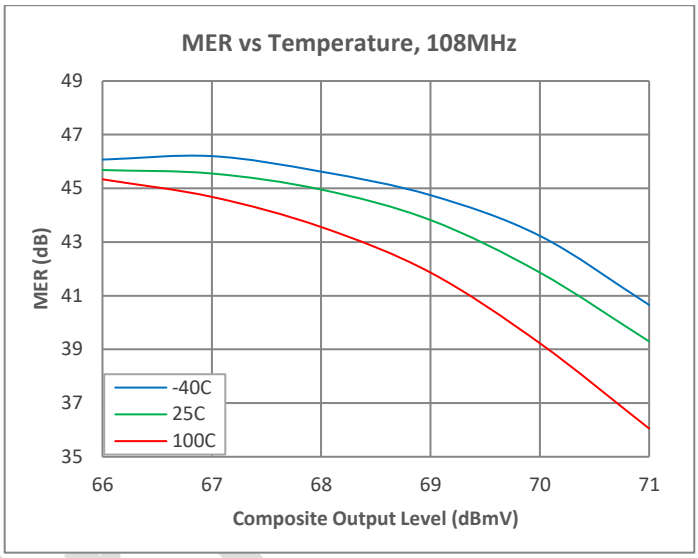
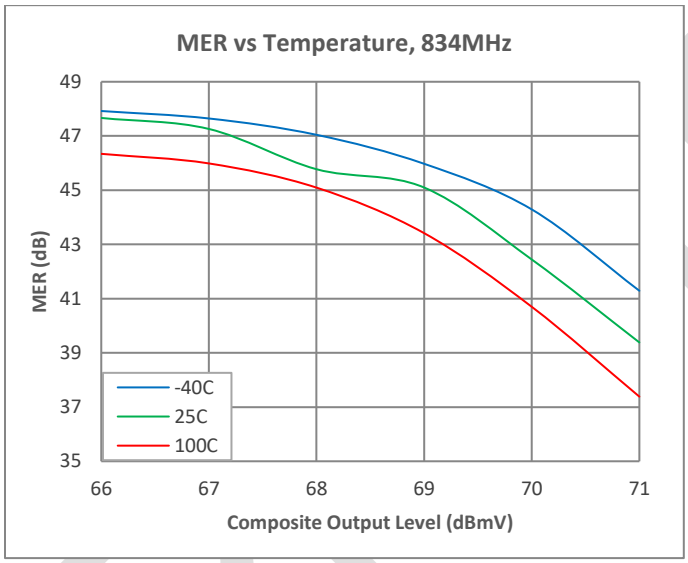
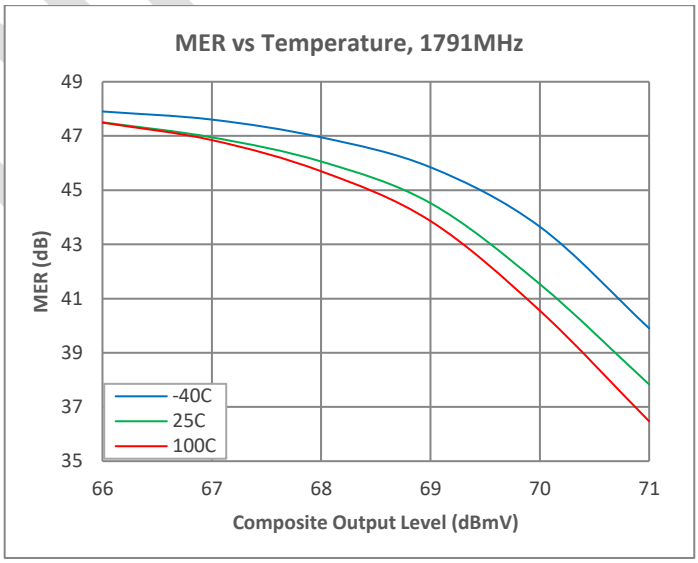




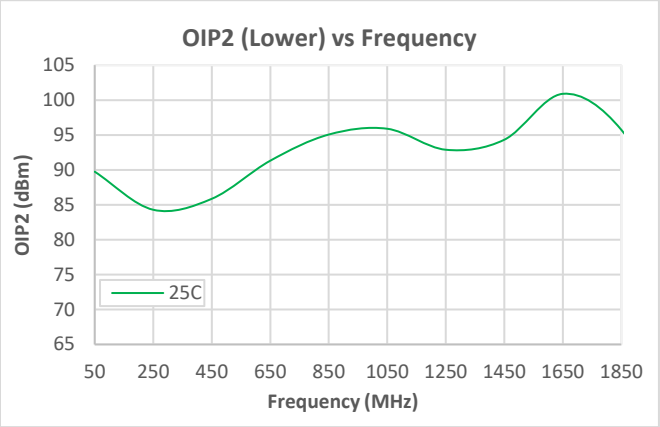


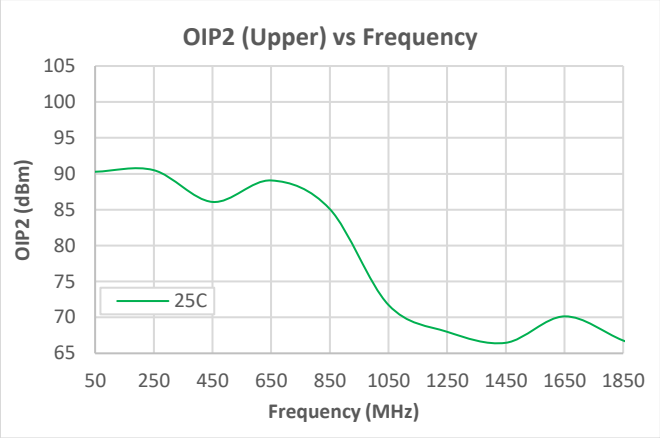


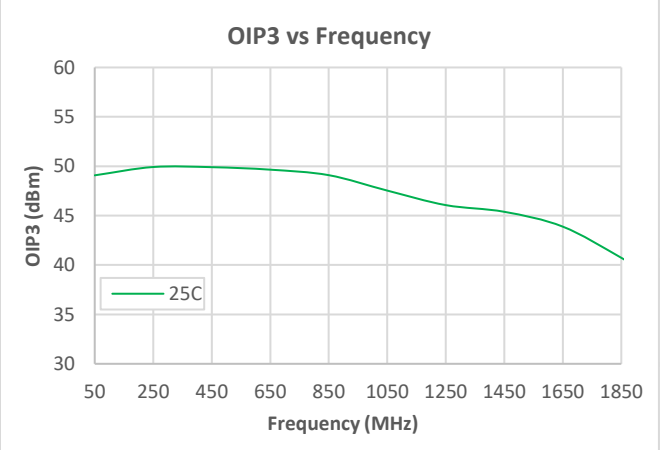
Test Conditions:

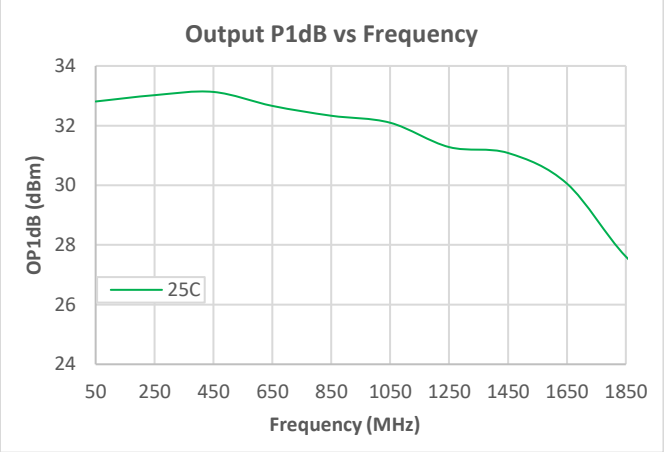
1. Test conditions unless otherwise noted: Vdd = +12V, Z_o = 75Ω
2. 108 – 1794 MHz, 280 Ch. SC-QAM, Tilt = 20dB

Performance Data





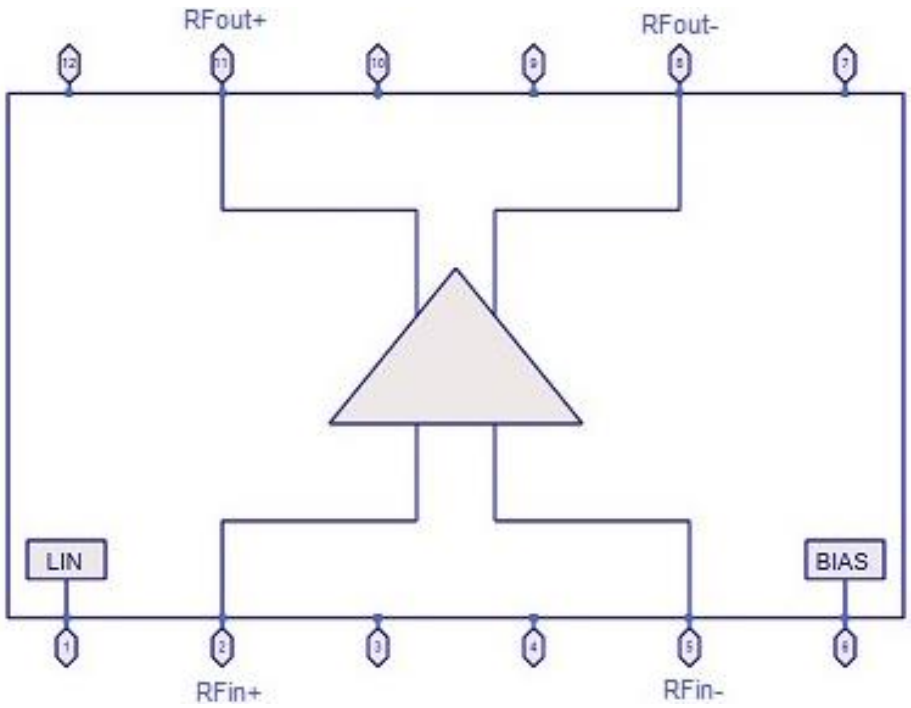




Test Conditions:

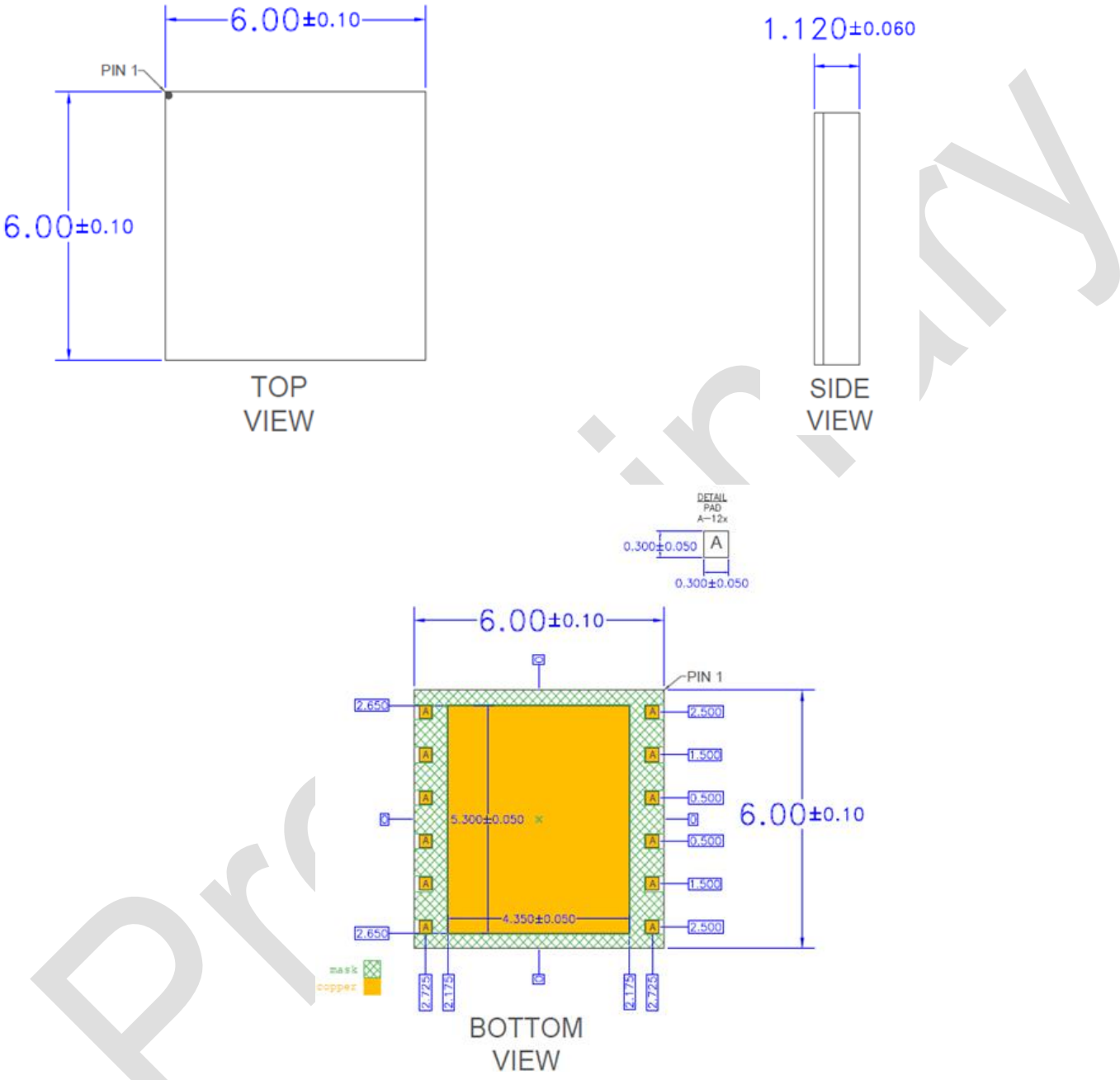
1. Test conditions unless otherwise noted: Vdd = +12V, Z_o = 75Ω
2. OIP2: +15dBm/Tone, Δf = 50MHz, Full Band
3. OIP3: +15dBm/Tone, Δf = 6MHz, Full Band

Pin Configuration and Description



Pin Number	Label	Description
1	LIN	Linearizer Current Set
2	RFin+	RF Input +
3	SRC1	Source - (DC/RF gnd)
4	SRC2	Source + (DC/RF gnd)
5	RFIN-	RF input -
6	Bias Adj	IDD adjust
7	Bias	Vdd connection for bias circuit
8	RFOUT-	RF output -
9	VG2	2nd stage gate bias adjust bin
10	N/A	No Connection
11	RFOUT+	RF output +
12	N/A	No Connection
Paddle	GND	DC/RF/Thermal Gnd (maximize vias in this area)

Package Outline



12-Pin 6x6 mm² Laminate Module

Notes:
1. Dimensions in millimeters

Package Marking