

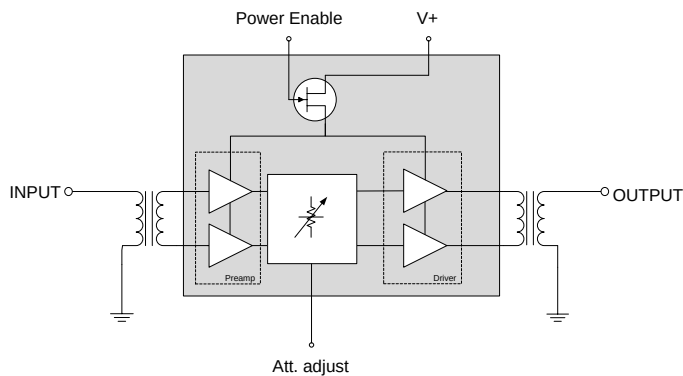
Product Description

The RFAM3790 is an Integrated Edge QAM Amplifier Module. The part employs GaAs pHEMT die, GaAs MESFET die, a 20dB range variable attenuator and a power enable feature, has high output capability, and is operated from 45MHz to 1218MHz. It provides excellent linearity and superior return loss performance with low noise and optimal reliability.



9 pin, 11.0 mm x 11.0 mm x 1.375 mm package

Functional Block Diagram



Product Features

- Excellent Linearity
- Extremely High Output Capability
- Voltage Controlled Attenuator
- Power Enable Feature
- Extremely Low Distortion
- Optimal Reliability
- Low Noise
- Unconditionally Stable Under all Terminations
- 28.5 dB Typical Gain at 1218MHz
- 410mA Typical at 12VDC

Applications

- 45MHz to 1218MHz Downstream Edge QAM RF Modulators
- Headend Equipment

Ordering Information

Part No.	Description
RFAM3790SB	Sample bag 5 pcs
RFAM3790SR	7" Reel with 100 pcs
RFAM3790TR7	7" Reel with 250 pcs
RFAM3790PCBA-410	Fully assembled Evaluation Board

Absolute Maximum Ratings

Parameter	Value / Range
DC Supply over-voltage (5 minutes)	+14 V
Storage Temperature	-40 to 110 °C
Operating Mounting Base Temperature	-30 to 110 °C

Operation of this device outside the parameter ranges given above may cause permanent damage.

Electrical Specifications

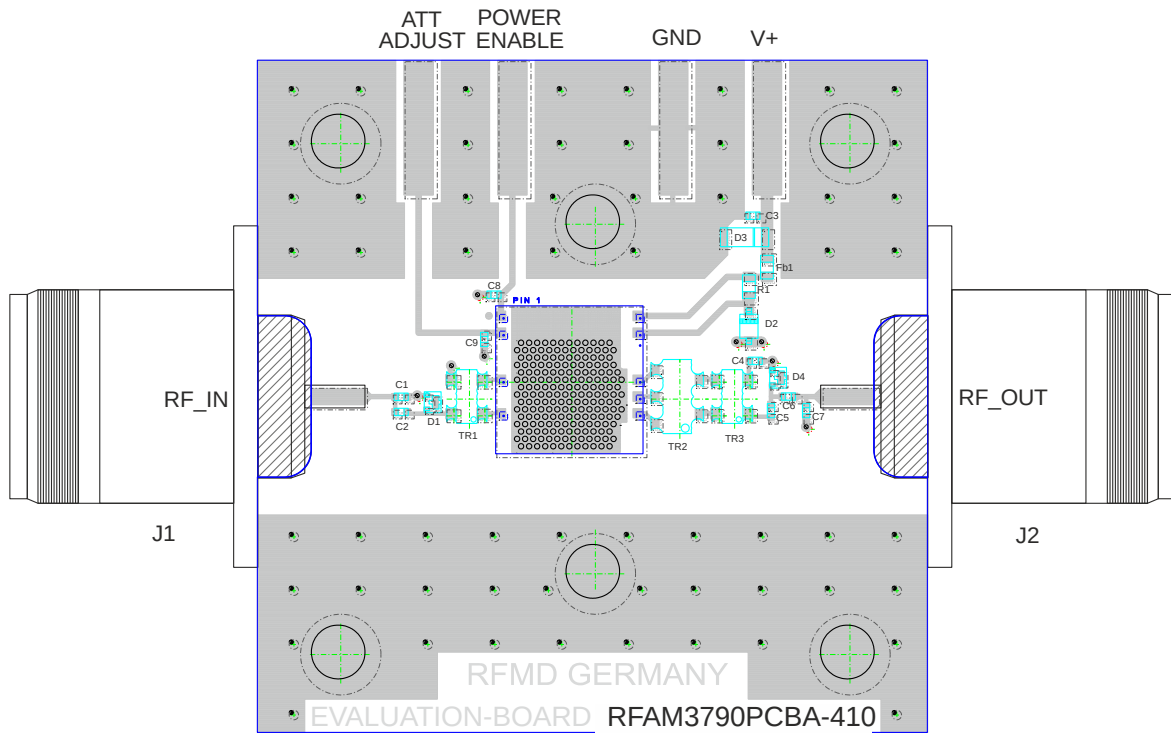
Parameter	Conditions (V+=12V, TMB=30°C, ZS=ZL=75Ω, ATT=0dB)	Min	Typ	Max	Unit
Power Gain	f=45MHz		27.0		dB
	f=1218MHz	27.5	28.5	29.5	dB
Slope ^[1]	f=45MHz to 1218MHz	0.5	1.5	2.5	dB
Flatness of Frequency Response	f=45MHz to 1218MHz (Peak to Valley)		0.5	1.0	dB
Input Return Loss	f=45MHz to 1003MHz	18			dB
	f=1003MHz to 1218MHz	16			dB
Output Return Loss	f=45MHz to 1003MHz	15			dB
	f=1003MHz to 1218MHz	15			dB
Noise Figure	f=50MHz to 1218MHz		4.0	5.0	dB
Total Current Consumption (DC)			410	450	mA
Attenuator	V+=12V, TMB=30°C, ZS=ZL=75Ω				
Attenuator Range	Attenuator Voltage 0V to 12V	0 to 20			dB
Power Enable/Disable	V+=12V, TMB=30°C, ZS=ZL=75Ω				
	Logic high (3.3V) applied to power enable pin ^[2]		Amp enabled		
	Logic low (0V) applied to power enable pin ^[3]		Amp disabled		

Electrical Specifications –continued-

Parameter	Conditions (V+=12V, TMB=30°C, ZS=ZL=75Ω, ATT=0dB)	Min	Typ	Max	Unit
Distortion					
Adjacent Channel Power Ratio (ACPR); N=4 contiguous 256QAM channels	Channel Power = 58dBmV; Adjacent channel up to 750 kHz from channel block edge			-58	dBc
	Channel Power = 58dBmV; Adjacent channel (750 kHz from channel block edge to 6MHz from channel block edge)			-60	dBc
	Channel Power = 58dBmV; Next-adjacent channel (6 MHz from channel block edge to 12 MHz from channel block edge)			-63	dBc
	Channel Power = 58dBmV; Third-adjacent channel (12 MHz from channel block edge to 18 MHz from channel block edge)			-65	dBc
2 nd Order Harmonic (HD2); N=1 256QAM channel	Channel Power = 66dBmV; In each of 2N contiguous 6 MHz channels coinciding with 2nd harmonic components (up to 1000MHz);			-63	dBc
3 rd Order Harmonic (HD3); N=1 256QAM channel	Channel Power = 66dBmV; In each of 3N contiguous 6 MHz channels coinciding with 3rd harmonic components (up to 1000MHz);			-63	dBc
CTB	V _O =46dBmV, flat, 79 analog channels plus 75 digital channels (-6dB offset) ^{[4], [6]}		-67		dBc
XMOD			-60		dBc
CSO			-70		dBc
CIN			64		dB
CTB	V _O =45dBmV, flat, 79 analog channels plus 111 digital channels (-6dB offset) ^{[5], [6]}		-67		dBc
XMOD			-61		dBc
CSO			-70		dBc
CIN			65		dB

- The slope is defined as the difference between the gain at the start frequency and the gain at the stop frequency.
- Logic high is defined as power enable voltage >2V
- Logic low is defined as power enable voltage <0.4V
- 79 analog channels, NTSC frequency raster: 55.25MHz to 547.25MHz, +46dBmV flat output level, plus 75 digital channels, -6dB offset relative to the equivalent analog carrier.
- 79 analog channels, NTSC frequency raster: 55.25MHz to 547.25MHz, +45dBmV flat output level, plus 111 digital channels, -6dB offset relative to the equivalent analog carrier.
- Composite Second Order (CSO) - The CSO parameter (both sum and difference products) is defined by ANSI/SCTE 6.
Composite Triple Beat (CTB) - The CTB parameter is defined by ANSI/SCTE 6.
Cross Modulation (XMOD) - Cross modulation (XMOD) is defined by ANSI/SCTE 58, measured at baseband (selective voltmeter method), referenced to 100% modulation of the carrier being tested
Carrier to Intermodulation Noise (CIN) - The CIN parameter is defined by ANSI/SCTE 17 (Test procedure for carrier to noise).

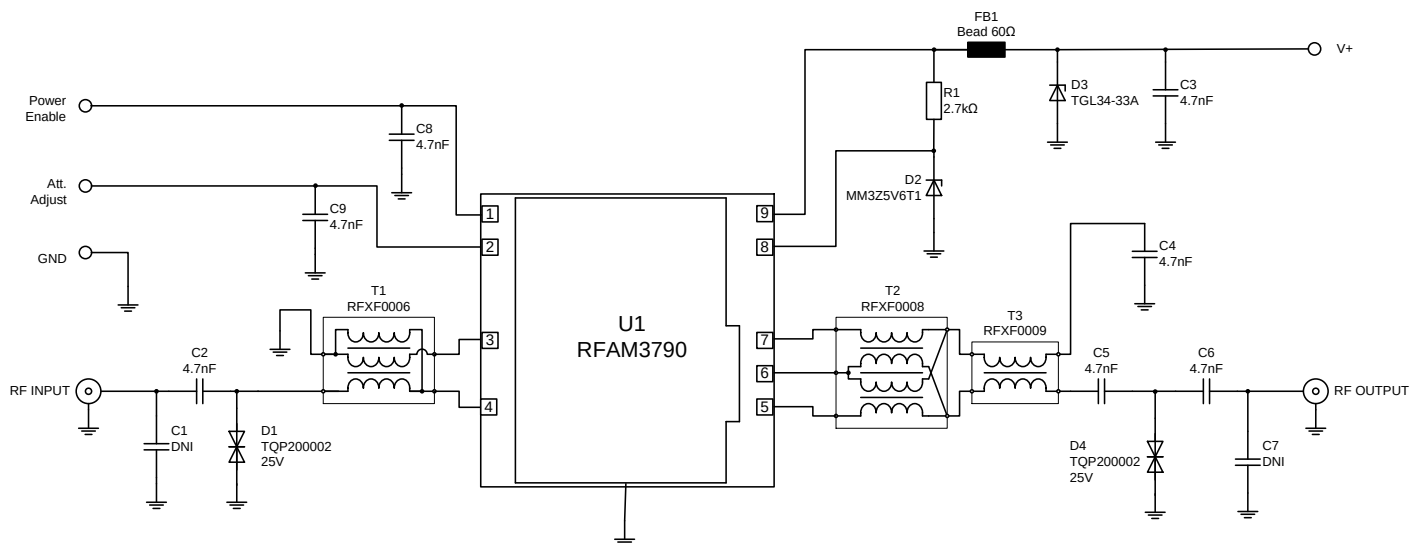
Evaluation Board Assembly Drawing



Note:

Vias are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation. A via drill diameter of 0.4mm and a minimum via wall copper plating thickness of 25um is recommended. Open vias are preferred to allow flux and gases to escape during reflow soldering and therefore to minimize voiding. Underneath this via array a heat sink with thermal grease needs to be placed which is able to dissipate the complete module DC power (up to 5 Watts). In any case the module backside temperature should not exceed 110 °C.

Evaluation Board Schematic

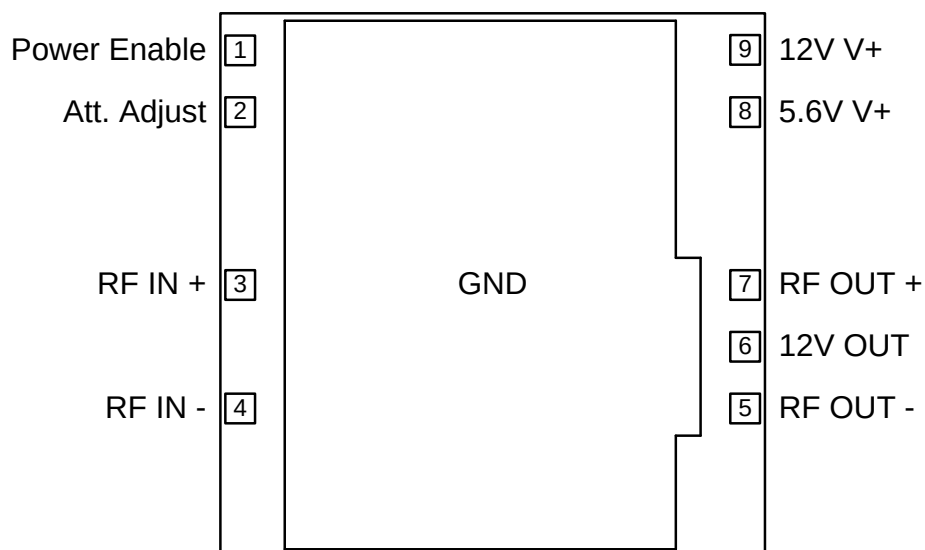


Evaluation Board Bill of Materials (BOM)

Reference Des.	Value	Description	Manuf.	Part Number
C1, C7	DNI	optional to improve matching in application		
C2, C3, C4, C5, C6, C8, C9	4.7nF	Capacitor, X7R, 50V, 10%, 0402	various	
R1	2.7kΩ	Resistor, TK200, 5%, 0603	various	
FB1	60Ω @ 100MHz	Impedance Bead, DCR 0.1Ohm, 800mA	Taiyo Yuden	BK 1608HS600-T
D1, D4	25V	Diode, ESD Protection	QORVO	TQP200002
D2	5.6V	Diode, Zener, 200mW	On Semiconductor	MM3Z5V6T1G
D3	33V	Diode, Transient Suppressor, 5%	Diotec	TGL34-33A
T1	1:1	Transformer	QORVO	RFXF0006
T2	2.8:1	Transformer	QORVO	RFXF0008
T3	1:1	Transformer	QORVO	RFXF0009
U1		Amplifier	QORVO	RFAM3790

Notes:

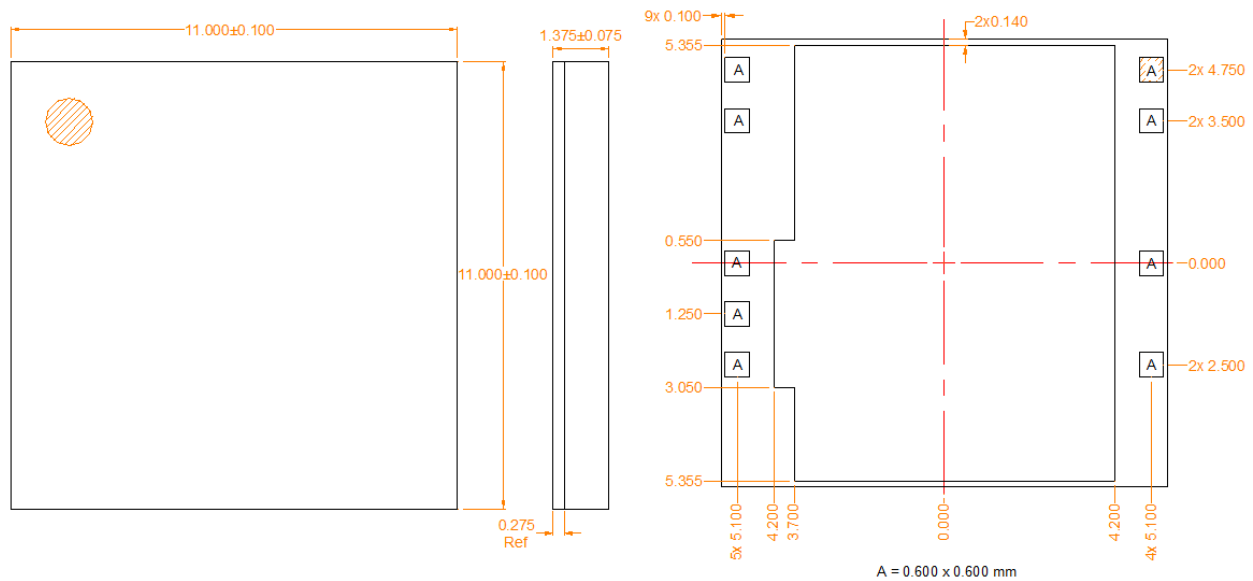
Pin Configuration



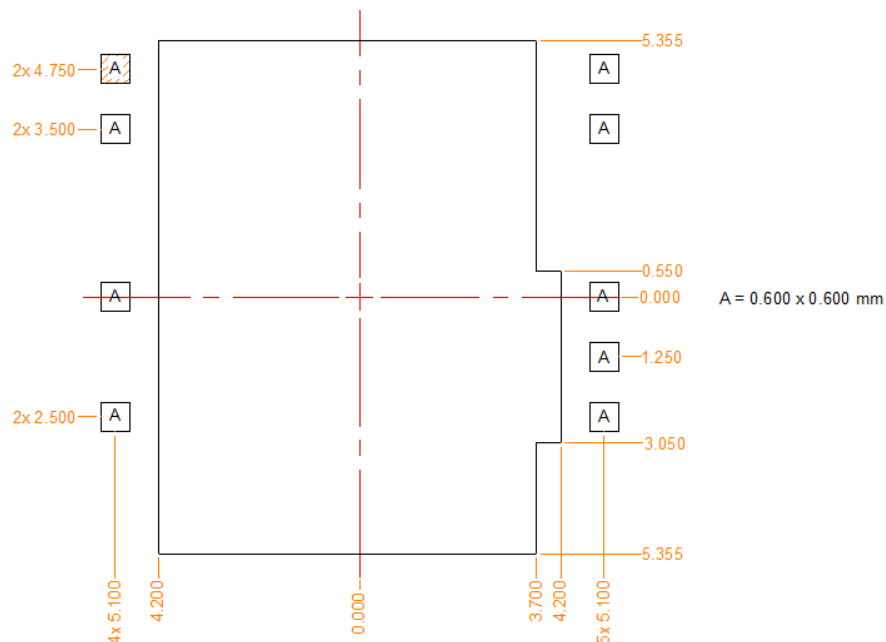
Pin Description

Pin No.	Label	Description
1	Power Enable	Logic Level (3.3V) Power Enable Control
2	Att. Adjust	Voltage Adjustable Attenuator
3	RF IN (+)	RF AMP Positive Input
4	RF IN (-)	RF AMP Negative Input
5	RF OUT (-)	RF AMP Negative Output
6	12V Out	12V Output
7	RF OUT (+)	RF AMP Positive Output
8	5.6V V+	Supply Voltage 5.6V
9	12V V+	Supply Voltage 12V

Package Outline Drawing (Dimensions in millimeter)



PCB metal land pattern (Dimensions in millimeter)



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1B	ANSI/ESDA/JEDEC JS-001-2012
ESD – Charged Device Model (CDM)	Class C3	ANSI/ESDA/JEDEC JS-002
MSL – Moisture Sensitivity Level	Level 3	IPC/JEDEC J-STD-020



Caution!
ESD-Sensitive Device

Solderability

Compatible with both lead-free (260°C max. reflow temp.) and tin/lead (245°C max. reflow temp.) soldering processes.
Solder profiles available upon request.

Contact plating: NiPdAu

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Halogen Free (Chlorine, Bromine)

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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