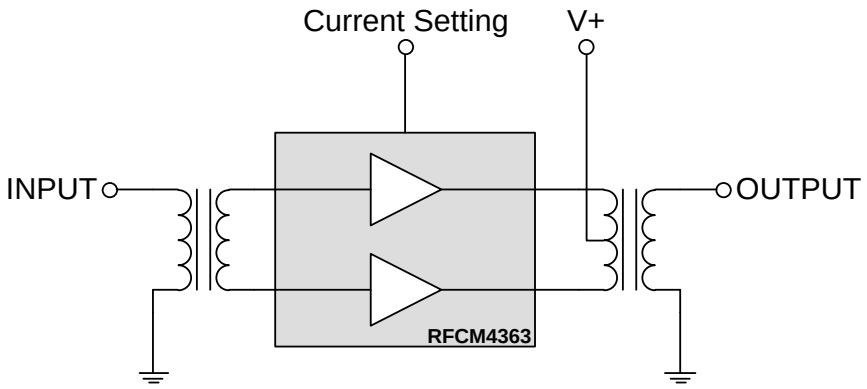
RFCM4363

45-1218MHZ GAAS/GAN PUSH PULL MODULE

The RFCM4363 is a Push Pull amplifier SMD module. The part employs GaAs MESFET, GaAs pHemt and GaN Hemt die and is operated from 45MHz to 1218MHz. It provides excellent linearity and superior return loss performance with low noise and optimal reliability.

DC current of the device can be externally adjusted for optimum distortion performance versus power consumption over a wide range of output level.

Package: 9 pin,
11.0 mm x 8.5 mm x 1.375mm



Functional Block Diagram

Features

- Excellent Linearity
- Superior Return Loss Performance
- Extremely Low Distortion
- Optimal Reliability
- Low Noise
- Unconditionally Stable Under all Terminations
- 27.5 dB Min. Gain at 1218MHz
- 270mA Max. at 24VDC

Applications

- 45MHz to 1218MHz CATV Amplifier Systems

Ordering Information

RFCM4363SB	Sample bag with 5 pieces
RFCM4363SQ	Sample bag with 25 pieces
RFCM4363SR	7” Reel with 100 pieces
RFCM4363TR7	7” Reel with 500 pieces
RFCM4363TR13	13” Reel with 1000 pieces
RFCM4363PCBA-410	Fully Assembled Evaluation Board
RFCM4363PCK-410	Fully Assembled Evaluation Board with Sample Bag

RF Micro Devices Inc. 7628 Thorndike Road, Greensboro, NC 27409-9421
For sales or technical support, contact RFMD at +1.336.678.5570 or customerservice@rfmd.com.

Absolute Maximum Ratings

Parameter	Rating	Unit
RF Input Voltage (single tone; on evaluation board)	70	dBmV
DC Supply Over-Voltage (5 minutes)	30	V
Storage Temperature	-40 to +100	°C
Operating Mounting Base Temperature	-30 to +110	°C
Moisture Sensitivity Level IPC/JEDEC J-STD-20	MSL 3 @260	°C

Caution! ESD sensitive device.

RoHS status based on EU Directive 2011/65/EU

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.

Nominal Operating Parameters

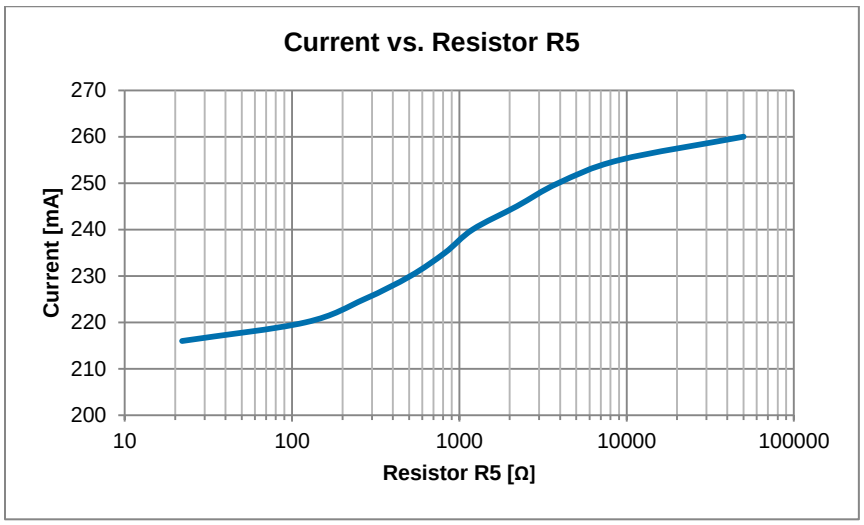
Parameter	Specification			Unit	Condition
	Min	Typ	Max		
General Performance					**V+= 24V; TMB=30°C; ZS=ZL=75Ω; IDC=IDC typical**
Power Gain		27.0		dB	f=45MHz
	27.5	28.0	29.0	dB	f=1218MHz
Slope[1]	0.5	1.0	2.0	dB	f=45MHz to 1218MHz
Flatness of Frequency Response			0.8	dB	f=45MHz to 1218MHz (Peak to Valley)
Input Return Loss	20			dB	f=45MHz to 320MHz
	19			dB	f=320MHz to 640MHz
	18			dB	f=640MHz to 870MHz
	17			dB	f=870MHz to 1000MHz
	16			dB	f=1000MHz to 1218MHz
Output Return Loss	20			dB	f=45MHz to 320MHz
	19			dB	f=320MHz to 640MHz
	18			dB	f=640MHz to 870MHz
	17			dB	f=870MHz to 1000MHz
	16			dB	f=1000MHz to 1218MHz
Noise Figure		4.6	5.5	dB	f=50MHz to 1218MHz
Total Current Consumption (DC)		250	270	mA	

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
Distortion data 40MHz to 550MHz					**V+= 24V; TMB=30°C; ZS=ZL=75Ω; IDC=IDC typical**
CTB		-72	-66	dBc	VO=46dBmV flat, 79 analog channels plus 75 digital channels (-6dB offset)[2][4]
XMOD		-63	-60	dBc	VO=46dBmV flat, 79 analog channels plus 75 digital channels (-6dB offset)[2][4]
CSO		-78	-70	dBc	VO=46dBmV flat, 79 analog channels plus 75 digital channels (-6dB offset)[2][4]
CIN	67	70		dB	VO=46dBmV flat, 79 analog channels plus 75 digital channels (-6dB offset)[2][4]
Distortion data 40MHz to 550MHz					**V+= 24V; TMB=30°C; ZS=ZL=75Ω; IDC=IDC typical**
CTB		-72		dBc	VO=45dBmV flat, 79 analog channels plus 111 digital channels (-6dB offset)[3][4]
XMOD		-65		dBc	VO=45dBmV flat, 79 analog channels plus 111 digital channels (-6dB offset)[3][4]
CSO		-76		dBc	VO=45dBmV flat, 79 analog channels plus 111 digital channels (-6dB offset)[3][4]
CIN		70		dB	VO=45dBmV flat, 79 analog channels plus 111 digital channels (-6dB offset)[3][4]

1. The slope is defined as the difference between the gain at the start frequency and the gain at the stop frequency.
2. 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.
3. 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.
4. Composite Second Order (CSO) - The CSO parameter (both sum and difference products) is defined by the NCTA. Composite Triple Beat (CTB) - The CTB parameter is defined by the NCTA. Cross Modulation (XMOD) - Cross modulation (XMOD) is 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).

Current Adjustment Using Resistor R5

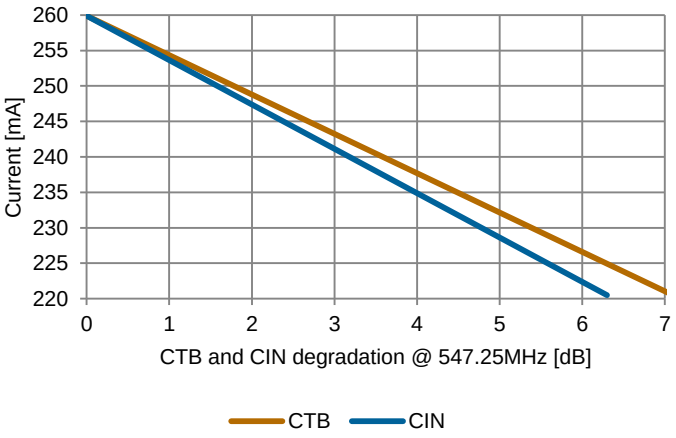
The RFCM4363 can be operated over a wide range of current to provide maximum required performance with minimum current consumption. Changing the value of resistor R5 on application circuit allows a variation of the current between 221mA and 252mA (typ.). Within the range of current between 221mA and 252mA gain (S21) change is less than 0.4dB and noise figure change is less than 0.1dB.



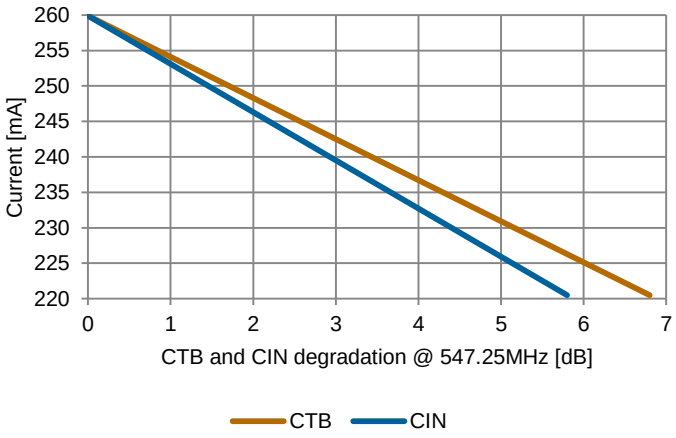
Device Current [mA], typical	R5 [Ω]
260	open
255	9100
250	3000
245	2200
240	1200
235	820
230	510
225	270
220	120
216	0
V+= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω	

Distortion Degradation over Device Current, typical values

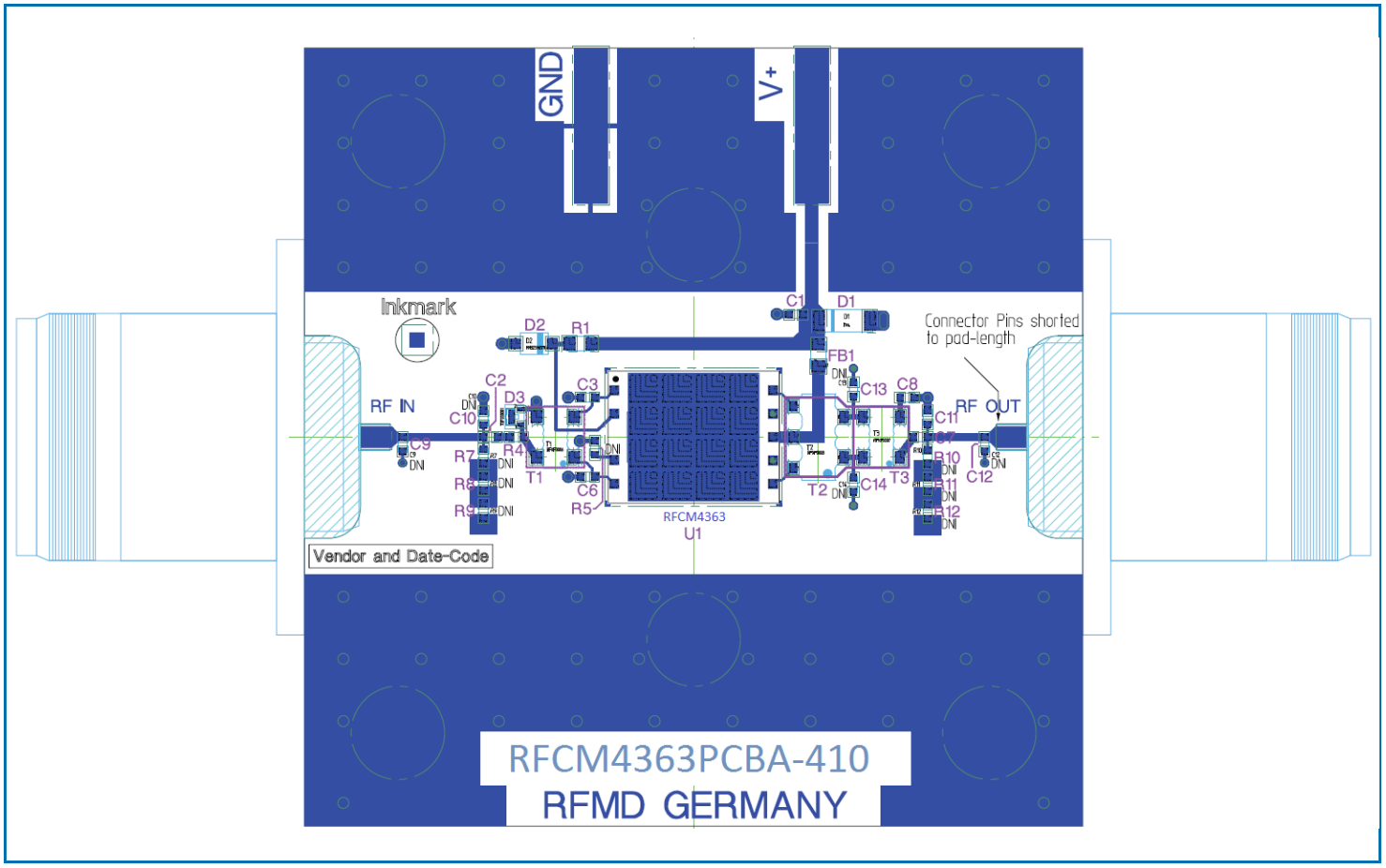
NTSC, 79ch analog; 46 dBmV; 0 dB tilt, with 75 QAM256 channels (6 dB down)



NTSC, 79ch analog; 45; 0 dB tilt, with 111 QAM256 channels (6 dB down)



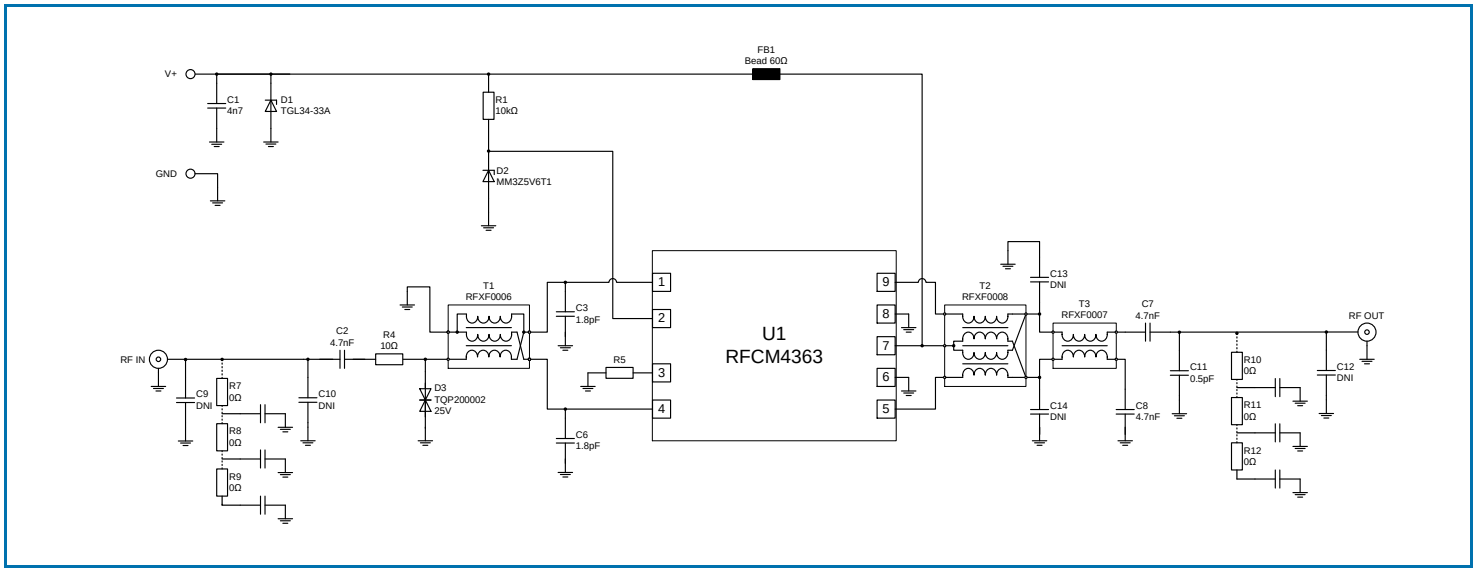
Evaluation Board Assembly Drawing



Note:

The ground plane of the RFCM4363 module should be soldered onto a board equipped with as many thermal vias as possible. Underneath this thermal via array a heat sink with thermal grease needs to be placed which is able to dissipate the complete module DC power (up to 6.5 Watts). In any case the module backside temperature should not exceed 100°C.

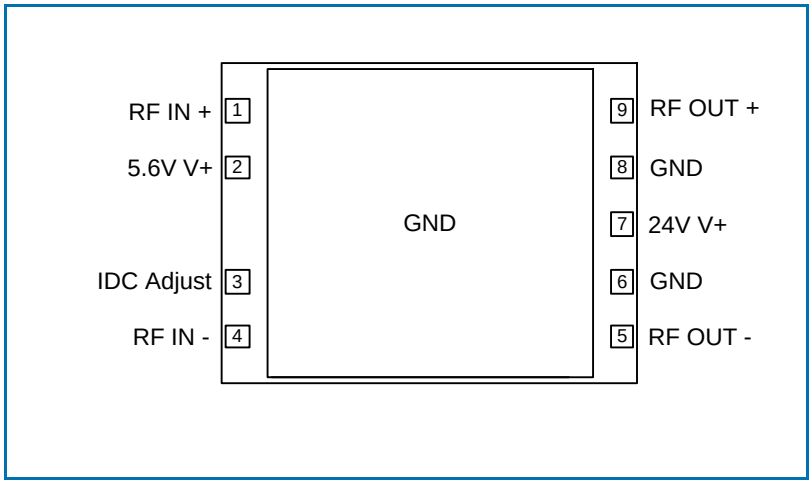
Evaluation Board Schematic



Evaluation Board Bill of Materials (BOM)

Component Type	Value	Qty	Designator	Comment
Capacitor	4.7nF	4	C1, C2, C7, C8	
Capacitor	DNI	5	C9, C10, C12, C13, C14	optional to improve matching in application
Capacitor	0.5pF	1	C11	
Capacitor	1.8pF	2	C3, C6	
Resistor	10kΩ	1	R1	
Resistor	10Ω	1	R4	
Resistor	DNI	6	R7, R8, R9, R10, R11, R12	optional to improve matching in application
Resistor	see page 4	1	R5	optional to set current value
Impedance Bead	60Ω @ 100MHz	1	FB1	
Transient Voltage Suppressor Diode	TGL34-33A	1	D1	
Zener Diode	MM3Z5V6T1G	1	D2	
ESD Protection Diode	TQP200002	1	D3	25V version
Transformer	RFXF0006	1	T1	
Transformer	RFXF0008	1	T2	
Transformer	RFXF0007	1	T3	
DUT	RFCM4363	1	U1	

Pin Out



Pin Names and Descriptions

Pin	Name	Description
1	**RF IN +**	RF AMP Positive Input
2	**5.6V V+**	Supply Voltage 5.6V
3	**IDC Adjust**	Current Adjustment
4	**RF IN -**	RF AMP Negative Input
5	**RF OUT -**	RF AMP Negative Output
6	**GND**	Ground
7	**24V V+**	Supply Voltage 24V
8	**GND**	Ground
9	**RF OUT +**	RF AMP Positive Output

Package Outline and Branding Drawing (Dimensions in millimeters)