RFCM3080

40-1003MHZ GAAS/GAN PUSH PULL MODULE

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

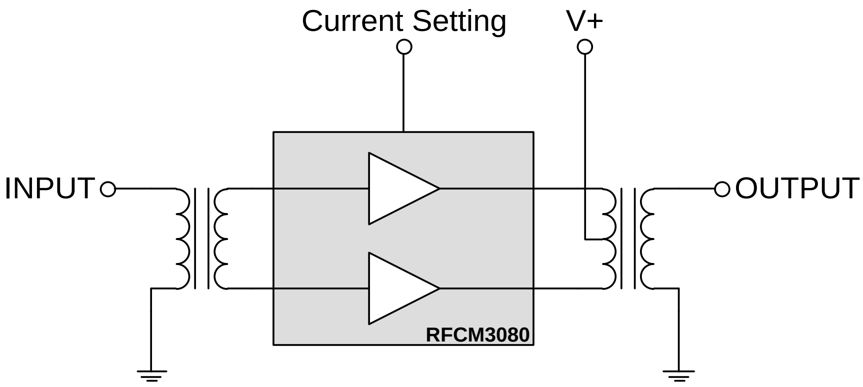
The RFCM3080 is a Push Pull amplifier SMD module. The part employs GaAs MESFET, GaAs pHemt and GaN Hemt die and is operated from 40MHz to 1003MHz. It provides excellent linearity and superior return loss performance with low noise and optimal reliability.
DC current of the device can be externally adjusted for optimum distortion performance versus power consumption over a wide range of output level.

Features

- Excellent Linearity
- Superior Return Loss Performance
- Extremely Low Distortion
- Optimal Reliability
- Low Noise
- Unconditionally Stable Under all Terminations
- 27.5dB Min. Gain at 1003MHz
- 270mA Max. at 24VDC

Applications

- 40MHz to 1003MHz CATV Amplifier Systems



Functional Block Diagram

Ordering Information

RFCM3080SB	Sample bag with 5 pieces
RFCM3080SQ	Sample bag with 25 pieces
RFCM3080SR	7” Reel with 100 pieces
RFCM3080TR7	7” Reel with 500 pieces
RFCM3080TR13	13” Reel with 1000 pieces
RFCM3080PCBA-410	Fully Assembled Evaluation Board
RFCM3080PCK-410	Fully Assembled Evaluation Board with Sample bag

Absolute Maximum Ratings

Parameter	Rating	Unit
RF Input Voltage (single tone)	70	dBmV
DC Supply Over-Voltage (5 minutes)	30	V
Storage Temperature	-40 to +100	°C
Operating Mounting Base Temperature	-30 to +100	°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

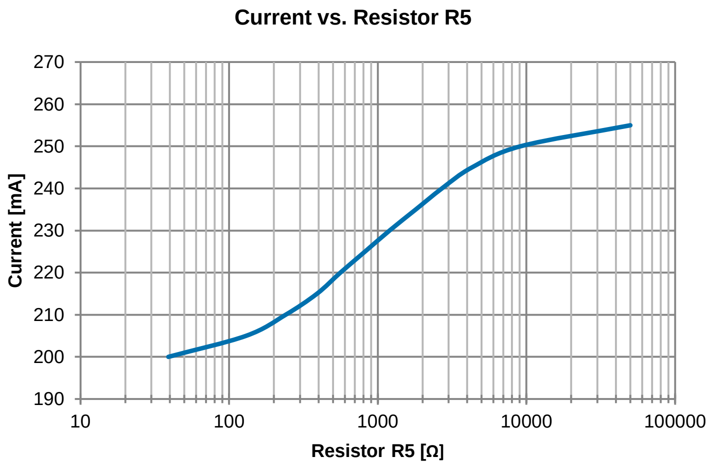
Parameter	Specification			Unit	Condition
	Min	Typ	Max		
General Performance					**V+= 24V; TMB=30°C; ZS=ZL=75Ω; IDC=IDC typical[1]**
Power Gain		27.0		dB	f=50MHz
	27.5	28.5	29.0	dB	f=1003MHz
Slope[2]	0.5	1.0	2.0	dB	f=40MHz to 1003MHz
Flatness of Frequency Response			0.8	dB	f=40MHz to 1003MHz (Peak to Valley)
Input Return Loss	20			dB	f=40MHz to 320MHz
	18			dB	f=320MHz to 640MHz
	17			dB	f=640MHz to 870MHz
	16			dB	f=870MHz to 1003MHz
Output Return Loss	20			dB	f=40MHz to 320MHz
	19			dB	f=320MHz to 640MHz
	18			dB	f=640MHz to 870MHz
	17			dB	f=870MHz to 1003MHz
Noise Figure		4.5	5.0	dB	f=50MHz to 1003MHz
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		-70	-65	dBc	VO=46dBmV flat, 79 analog channels plus 75 digital channels (-6dB offset)[3][4]
XMOD		-63	-58	dBc	VO=46dBmV flat, 79 analog channels plus 75 digital channels (-6dB offset)[3][4]
CSO		-75	-66	dBc	VO=46dBmV flat, 79 analog channels plus 75 digital channels (-6dB offset)[3][4]
CIN	65	69		dB	VO=46dBmV flat, 79 analog channels plus 75 digital channels (-6dB offset)[3][4]

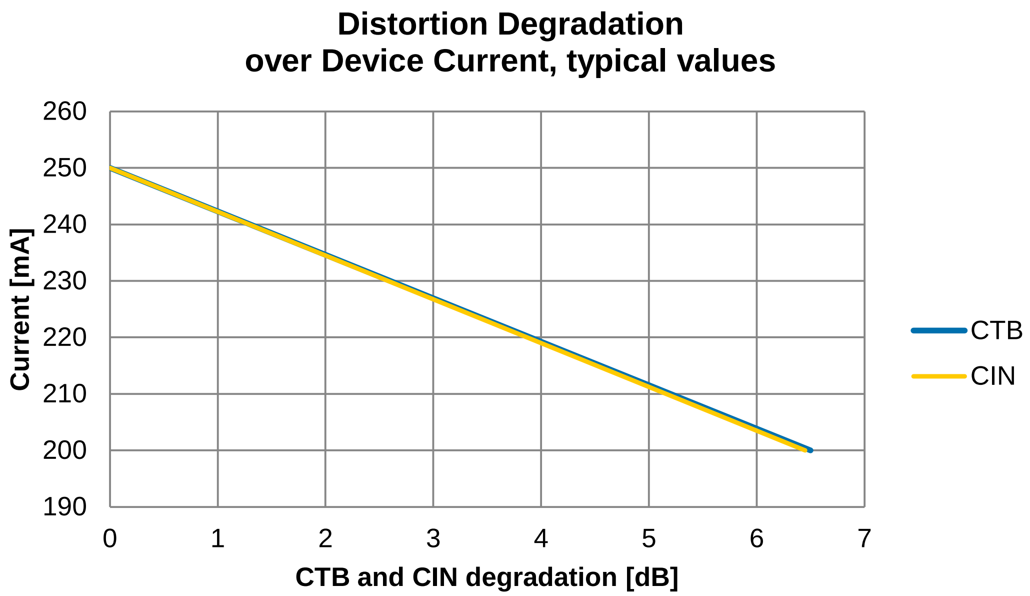
1. Test Condition: PIN3 not connected
2. The slope is defined as the difference between the gain at the start frequency and the gain at the stop frequency.
3. 79 analog channels, NTSC frequency raster: 55.25MHz to 547.25MHz, +46dBmV flat output level, plus 75 digital channels, -6dB offset relative to the equivalent analog carrier.
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 RFCM3080 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 200mA and 255mA (typ.). Within the range of current between 200mA and 255mA gain (S21) change is less than 0.4dB and noise figure change is less than 0.1dB.



Device Current [mA], typical	R5 [Ω]
255	open
250	9100
245	4300
240	2700
235	1800
230	1200
225	820
220	560
215	390
210	240
205	130
200	39
V+= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω	

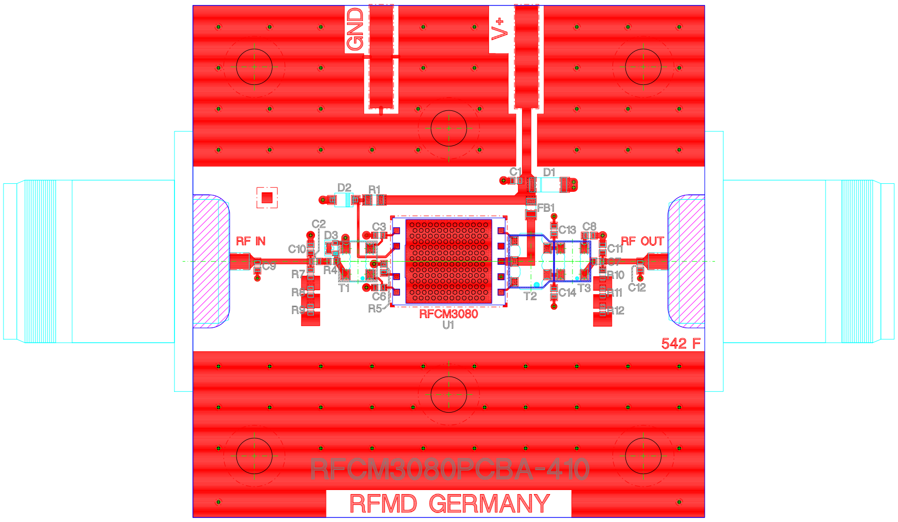


Test condition:

V+= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω;

VO=46dBmV flat, 79 analog channels plus 75 digital channels (-6dB offset)

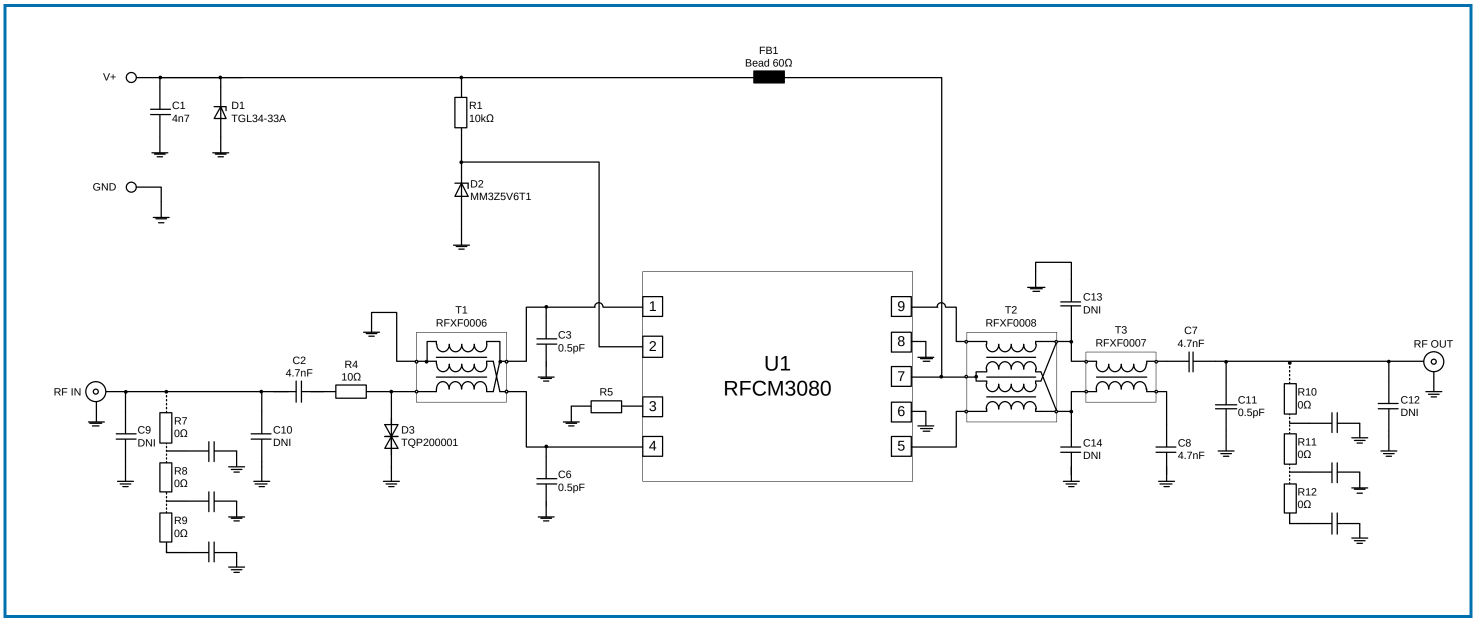
Evaluation Board Assembly Drawing



Note:

The ground plane of the RFCM3080 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.

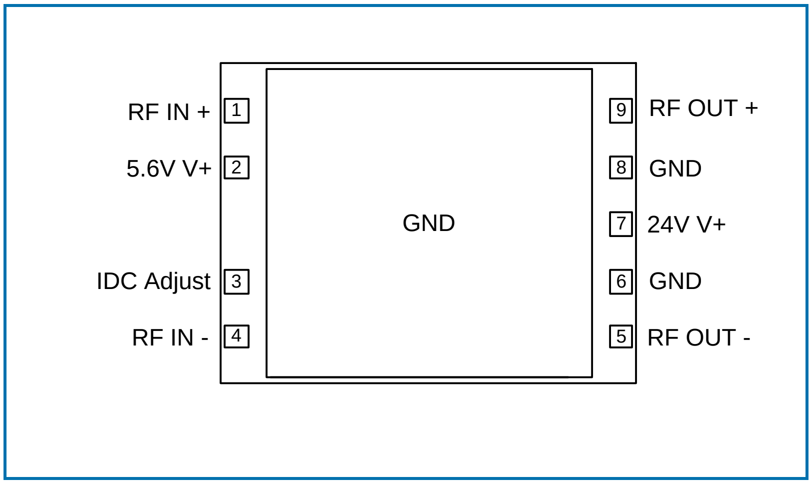
Evaluation Board Schematic



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	3	C3, C6, C11	
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	
Transformer	RFXF0006	1	T1	
Transformer	RFXF0008	1	T2	
Transformer	RFXF0007	1	T3	
DUT	RFCM3080	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)