RFMD

rfmd.com

RFCM3050

40-1003MHZ GAAS/GAN POWER DOUBLER MODULE

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

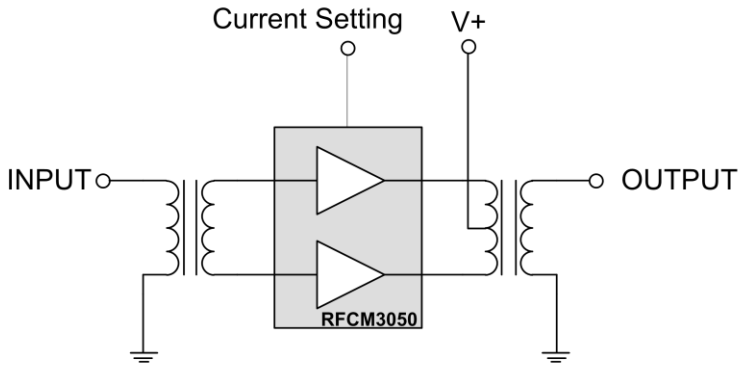
RoHS

Features

- Excellent Linearity
- Superior Return Loss Performance
- Extremely Low Distortion
- Optimal Reliability
- Low Noise
- Unconditionally Stable Under all Terminations
- High Output Capability
- 24.5dB Min. Gain at 1003MHz
- 440mA Max. at 24VDC

Applications

- 40MHz to 1003MHz CATV Amplifier Systems



Functional Block Diagram

Product Description

The RFCM3050 is a Power Doubler amplifier SMD module. The part employs GaAs MESFET, GaAs pHemt and GaN Hemt die, has high output capability, 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 vs. power consumption over a wide range of output level.

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Ordering Information

RFCM3050SB	Sample Bag 5 pieces
RFCM3050SQ	Sample Bag 25 pieces
RFCM3050SR	7” Reel with 100 pieces
RFCM3050TR7	7” Reel with 500 pieces
RFCM3050TR13	13” Reel with 1000 pieces
RFCM3050PCBA-410	Fully Assembled Evaluation Board
RFCM3050PCK-410	Fully Assembled Evaluation Board with Sample Pack

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	☒ GaAs pHEMT	☒ GaN HEMT
☒ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	☐ RF MEMS
☐ InGaP HBT	☐ SiGe HBT	☐ Si BJT	☐ LDMOS

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.

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.

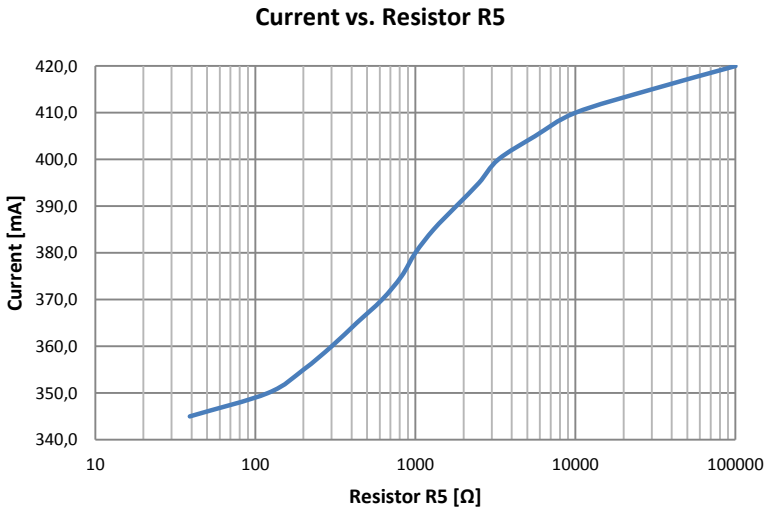
RoHS (Restriction of Hazardous Substances): Compliant per EU Directive 2002/95/EC.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					V+= 24V; TMB=30°C; ZS=ZL=75Ω
Power Gain	23.5	24.0	24.5	dB	f=50MHz
	24.5	25.0	26.0	dB	f=1003MHz
Slope[1]	0.5	1.0	2.0	dB	f=40MHz to 1003MHz
Flatness of Frequency Response			0.8	dB	f=40MHz to 1003MHz
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		5.0	5.5	dB	f=50MHz to 1003MHz
Total Current Consumption (DC)		420.0	440.0	mA	
Distortion data 40MHz to 550MHz					V+= 24V; TMB=30°C; ZS=ZL=75Ω
CTB		-75	-70	dBc	V_O=56.4dBmV at 1000MHz, 13.4dB extrapolated tilt, 79 analog channels plus 75 digital channels (-6dB offset)[2]
XMOD		-70	-65	dBc	V_O=56.4dBmV at 1000MHz, 13.4dB extrapolated tilt, 79 analog channels plus 75 digital channels (-6dB offset)[2]
CSO		-70	-65	dBc	V_O=56.4dBmV at 1000MHz, 13.4dB extrapolated tilt, 79 analog channels plus 75 digital channels (-6dB offset)[2]
CIN	60	66		dB	V_O=56.4dBmV at 1000MHz, 13.4dB extrapolated tilt, 79 analog channels plus 75 digital channels (-6dB offset)[2]

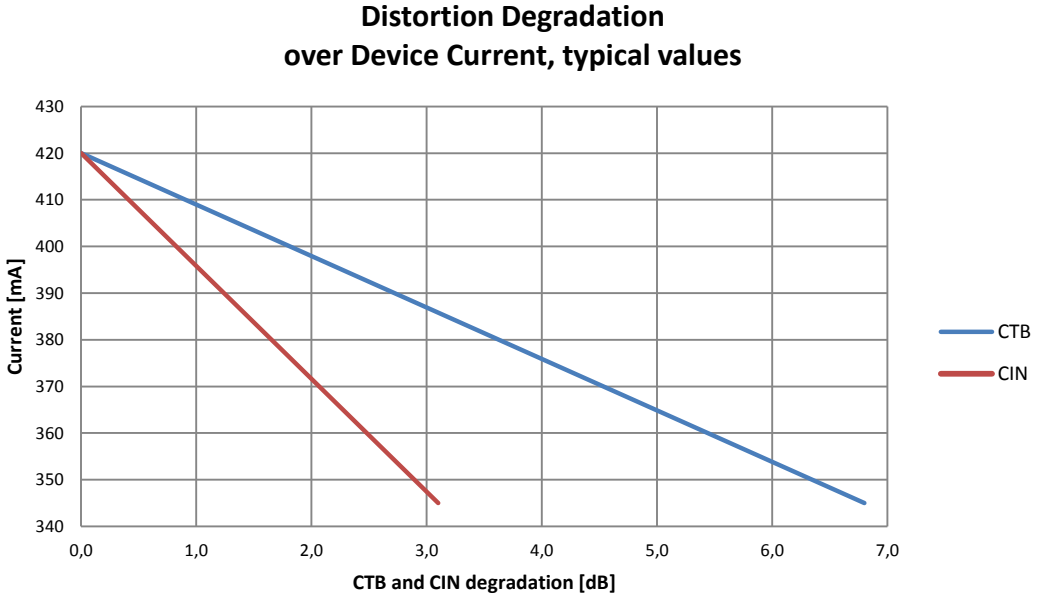
1. The slope is defined as the difference between the gain at the start frequency and the gain at the stop frequency.
2. 79 analog channels, NTSC frequency raster: 55.25MHz to 547.25MHz, +43dBmV to +50dBmV tilted output level, plus 75 digital channels, -6dB offset relative to the equivalent analog carrier.Composite Second Order (CSO) - The CSO parameter (both sum and difference products) is defined by 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 RFCM3050 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 420mA and 345mA (typ.). Within the range of current between 420mA and 345mA gain (S21) change is less than 0.4dB and noise figure change is less than 0.1dB.

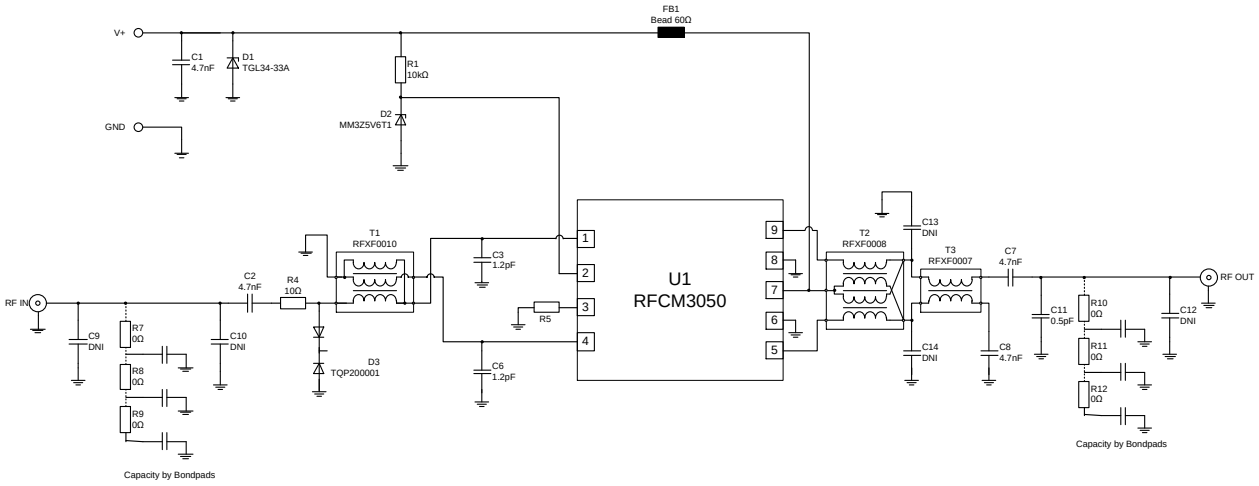


Device Current [mA], typical	R5 [Ω] typical
420	open
400	3300
380	1000
360	300
350	120
345	0
	V+= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω

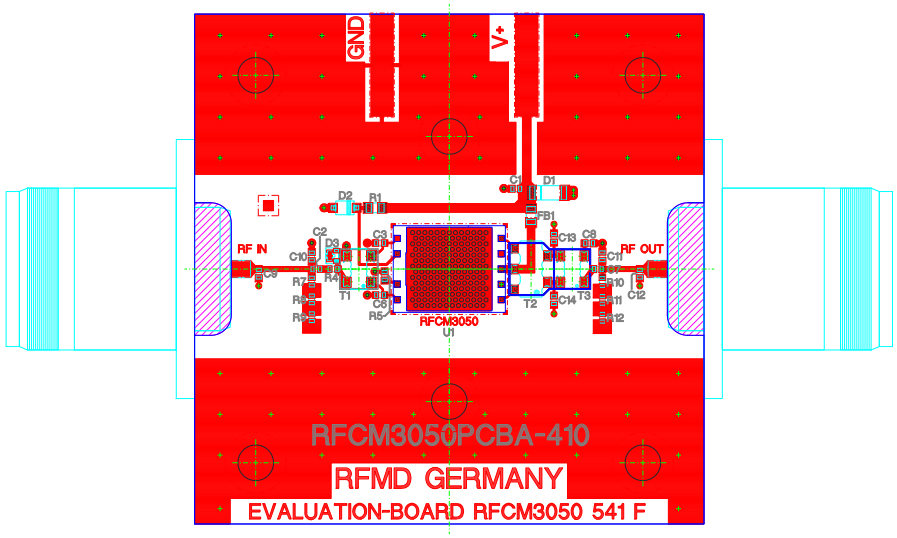


Test condition:
V+= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω;
NTSC, 79ch analog; 50 dBmV @ 547.25 MHz; 7 dB tilt, with 75 QAM256 channels (6 dB down)

Application Circuit



Evaluation Board Layout



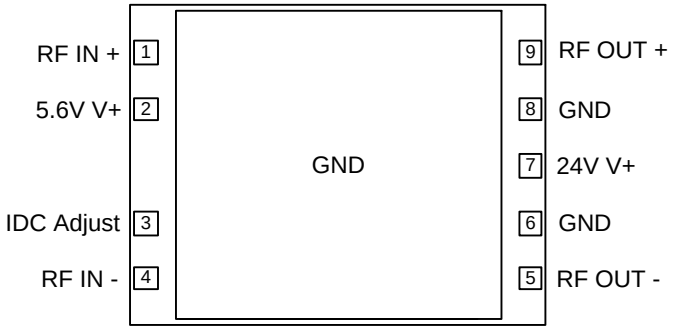
Note:
The ground plane of the RFCM3050 module should be soldered onto a board equipped with as many thermal vias as possible. Underneath this thermal via array a heat sink with thermal grease needs to be placed which is able to dissipate the complete module DC power (up to 10.6 Watts). In any case the module backside temperature should not exceed 100°C.

Component Chart

Component Type	Value	Qty	Designator	Comment
Capacitor	4.7nF	4	C1, C2, C7,C8	
Capacitor	1.2pF	2	C3, C6	
Capacitor	0.5pF	1	C11	
Capacitor	DNI	5	C9, C10, C12, C13, C14	optional to improve matching in application
Resistor	10kΩ	1	R1	
Resistor	10Ω	1	R4	
Resistor	see page 3	1	R5	optional to set current-value
Resistor	0Ω	6	R7, R8, R9, R10, R11, R12	optional to improve matching in application (Capacity by Bondpads)
Impedance Bead	60Ω @ 100MHz	1	FB1	
Transient Voltage Suppressor Diode	TGL34-33A	1	D1	
Zener Diode	MM3Z5V6T1G	1	D2	
ESD-Protection Diode	TQP200001	1	D3	
Transformer	RFXF0010	1	T1	
Transformer	RFXF0008	1	T2	
Transformer	RFXF0009	1	T3	
DUT	RFCM3050	1	U1	

Pin Configuration

Pin	Function	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 Drawing

Dimensions in millimeters