RFPD2650

45-1003MHZ GAAS/GAN PWR DBLR HYBRID

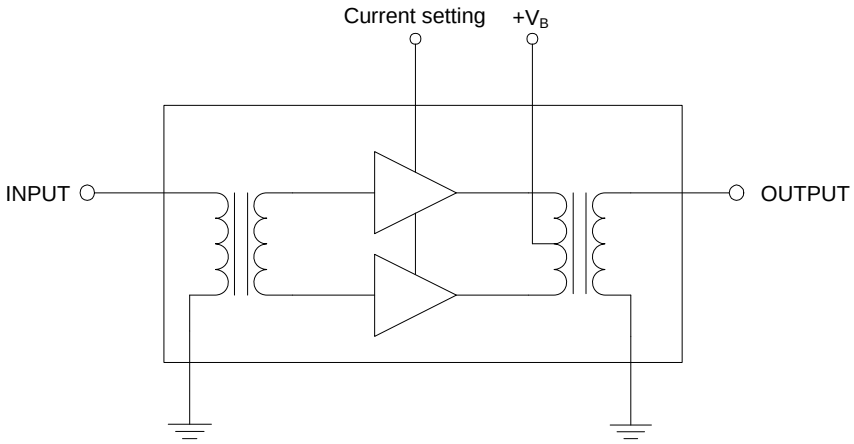
Package: SOT-115J

Features

- Excellent Linearity
- Superior Return Loss Performance
- Extremely Low Distortion
- Optimal Reliability
- Low Noise
- Unconditionally Stable Under all Terminations
- Extremely High Output Capability
- 22.5dB Min. Gain at 1003MHz
- 450mA Max. at 24VDC
- Extra Pin For Current Adjustment

Applications

- 45MHz to 1003MHz CATV Amplifier Systems



Functional Block Diagram

Product Description

The RFPD2650 is a Hybrid Power Doubler amplifier module. The part employs GaAs pHEMT die and GaN HEMT die, has extremely high output capability, and is operated from 45MHz 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.

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	☑ GaAs pHEMT	☑ GaN HEMT
☐ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	☐ BiFET HBT
☐ InGaP HBT	☐ SiGe HBT	☐ Si BJT	☐ LDMOS

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Absolute Maximum Ratings

Parameter	Rating	Unit
RF Input Voltage (single tone)	65	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 status based on EUDirective2002/95/EC (at time of this document revision).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					V_B= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω, IDC set >370mA
Power Gain	21.0	21.5	22.0	dB	f=45MHz
	22.5	23.0	24.0	dB	f=1003MHz
Slope[1]	1.0	1.5	2.5	dB	f=45MHz to 1003MHz
Flatness of Frequency Response			0.8	dB	f=45MHz to 1003MHz
Input Return Loss	-20			dB	f=45MHz to 320MHz
	-19			dB	f=320MHz to 640MHz
	-18			dB	f=640MHz to 870MHz
	-16			dB	f=870MHz to 1003MHz
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 1003MHz
Noise Figure		3.5	4.5	dB	f=50MHz to 1003MHz
Total Current Consumption (DC)		430.0	450.0	mA	[2]
Distortion data					V_B= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω; IDC=IDC typical [2]
CTB		-78	-74	dBc	79 ch. 7dB tilted; V_O=50dBmV at 550MHz, plus 75 digital channels (-6dB offset)[3]
XMOD		-71	-68	dBc	79 ch. 7dB tilted; V_O=50dBmV at 550MHz, plus 75 digital channels (-6dB offset)[3]
CSO		-71	-68	dBc	79 ch. 7dB tilted; V_O=50dBmV at 550MHz, plus 75 digital channels (-6dB offset)[3]
CIN	63	67		dB	79 ch. 7dB tilted; V_O=50dBmV at 550MHz, plus 75 digital channels (-6dB offset)[3]
Distortion data					V_B= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω; IDC=370mA
CTB		-70		dBc	79 ch. 7dB tilted; V_O=50dBmV at 550MHz, plus 75 digital channels (-6dB offset)[3]
XMOD		-65		dBc	79 ch. 7dB tilted; V_O=50dBmV at 550MHz, plus 75 digital channels (-6dB offset)[3]
CSO		-71		dBc	79 ch. 7dB tilted; V_O=50dBmV at 550MHz, plus 75 digital channels (-6dB offset)[3]
CIN		61		dB	79 ch. 7dB tilted; V_O=50dBmV at 550MHz, plus 75 digital channels (-6dB offset)[3]

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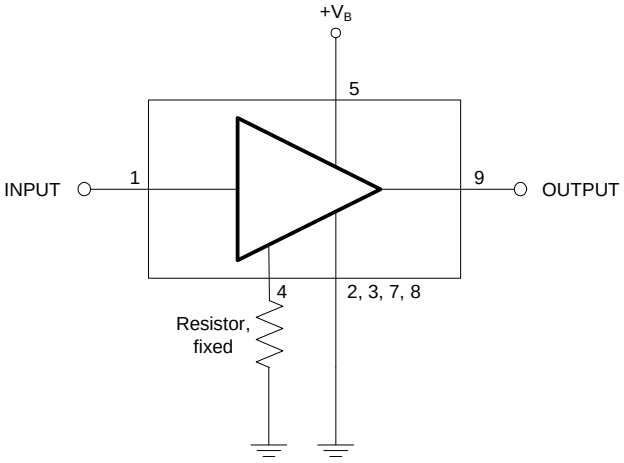
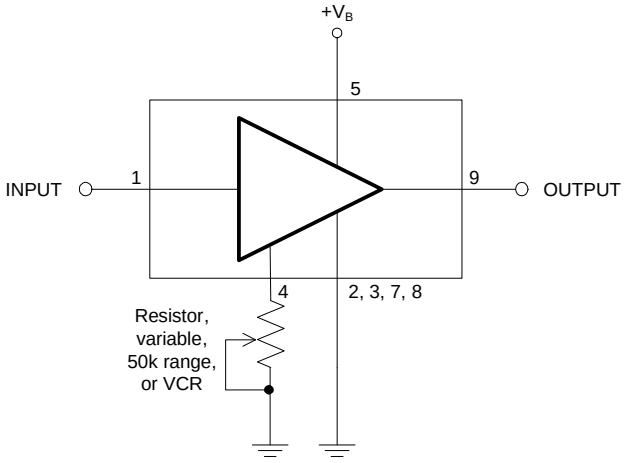
[1] The slope is defined as the difference between the gain at the start frequency and the gain at the stop frequency.
[2] Test condition: Pin 4 not connected
[3] 79 analog channels, NTSC frequency raster: 55.25MHz to 547.25MHz, +43dBmV to +50dBmV tilted output level, plus 75 digital channels, -6dB offset 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 car-rier 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 Hybrid Pin 4

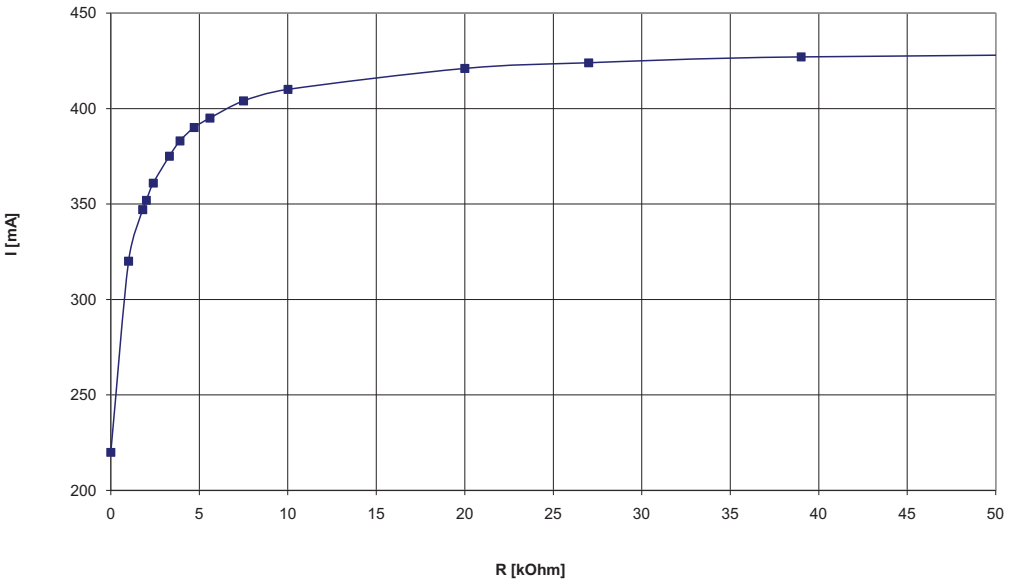
The RFPD2650 can be operated over a wide range of current to provide maximum required performance with minimum current consumption. A single external resistor connected between pin 4 and GND allows variation of current between 430mA and 220mA (typ.). Within the recommended range of current between 430mA and 370mA gain (S21) change is less than 0.2dB and noise figure change is less than 0.1dB. If pin 4 is not connected the devices operates at maximum current, see table below.

Examples of connecting pin 4:





RFPD2650 Current vs. external resistor



Device current [mA], typical	External resistor [Ohm]
430	>50k (open)
420	18k
400	6k8
370	3k
340	1k8
320	1k
220	0 (short)
	V_B= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω

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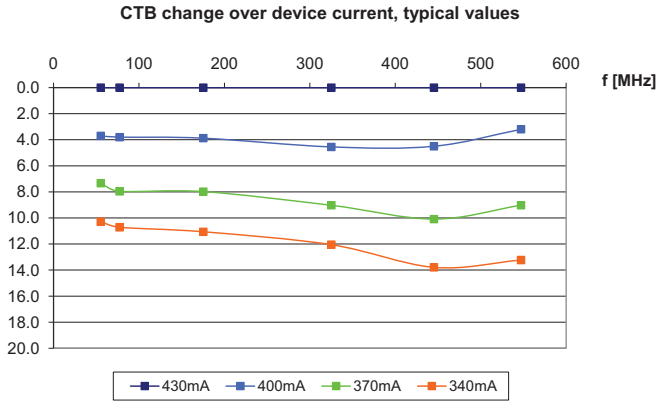
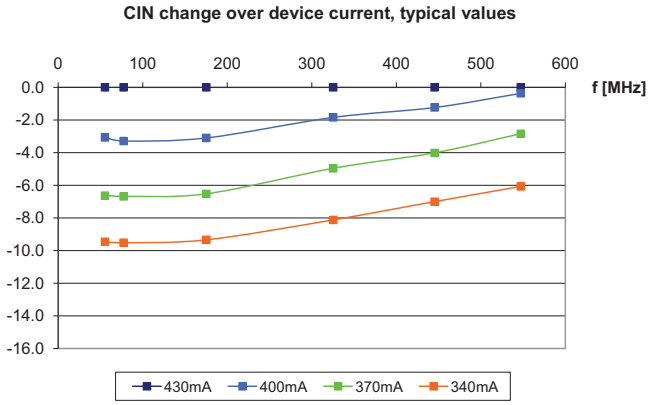
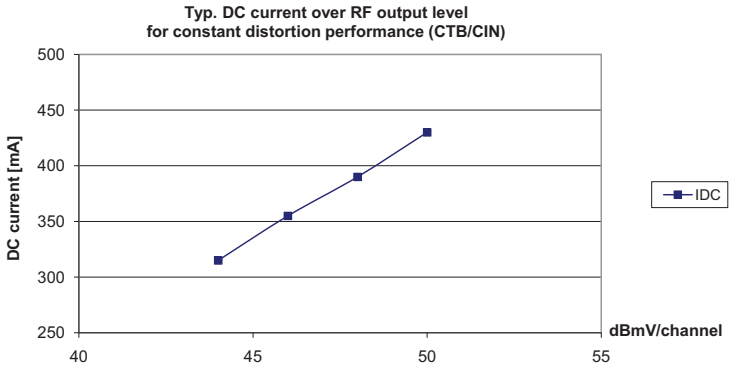
Change of Distortion Performance Over Current





Test condition:
V_B= 24V; T_{MB}=30°C; Z_S=Z_L=75Ω; 79 ch. 7dB tilted; V_O=50dBmV at 550MHz, plus 75 digital channels (-6dB offset)



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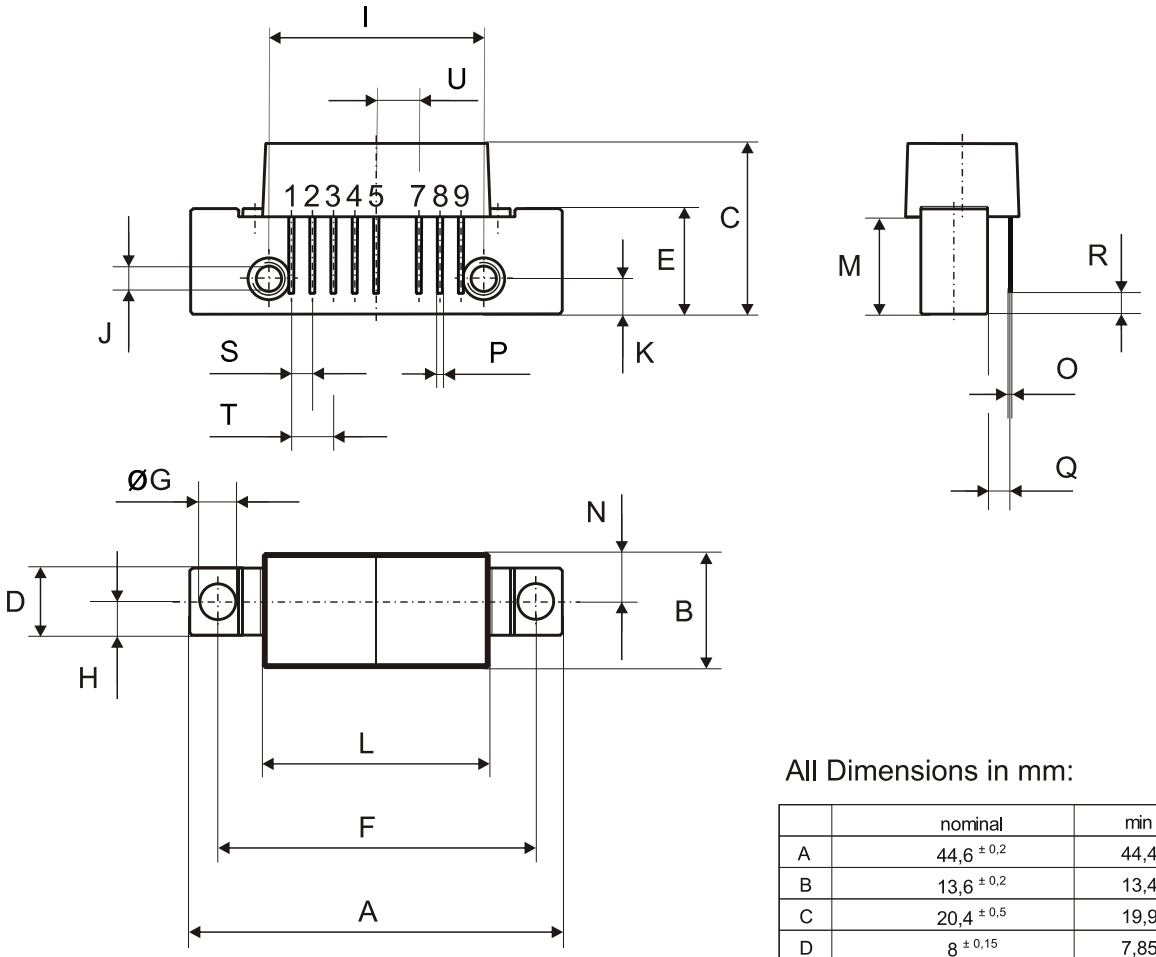


All Dimensions in mm:

	nominal	min	max
A	44,6 ± 0,2	44,4	44,8
B	13,6 ± 0,2	13,4	13,8
C	20,4 ± 0,5	19,9	20,9
D	8 ± 0,15	7,85	8,15
E	12,6 ± 0,15	12,45	12,75
F	38,1 ± 0,2	37,9	38,3
G	4 +0,2 / -0,05	3,95	4,2
H	4 ± 0,2	3,8	4,2
I	25,4 ± 0,2	25,2	25,6
J	UNC 6-32	-	-
K	4,2 ± 0,2	4,0	4,4
L	27,2 ± 0,2	27,0	27,4
M	11,6 ± 0,5	11,1	12,1
N	5,8 ± 0,4	5,4	6,2
O	0,25 ± 0,02	0,23	0,27
P	0,45 ± 0,03	0,42	0,48
Q	2,54 ± 0,3	2,24	2,84
R	2,54 ± 0,5	2,04	3,04
S	2,54 ± 0,25	2,29	2,79
T	5,08 ± 0,25	4,83	5,33
U	5,08 ± 0,25	4,83	5,33

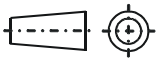
Pinning:

1	2	3	4	5	6	7	8	9
INPUT	GND	GND	IDC ADJUSTMENT	+VB		GND	GND	OUTPUT

0 5 10mm
scale

Notes:

European Projection



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