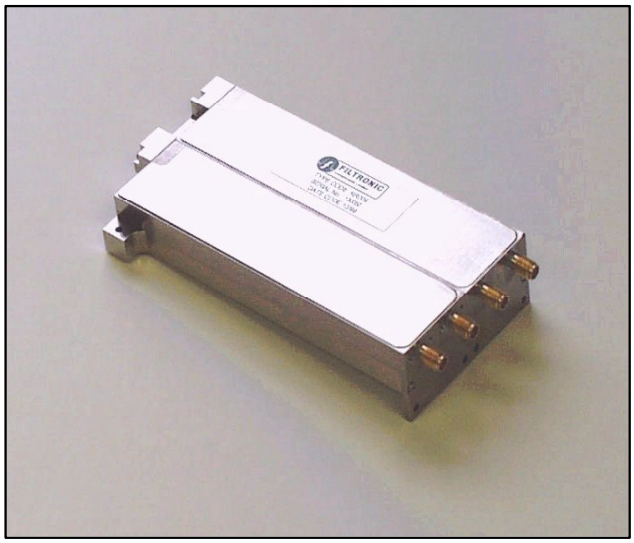
Filtronic

Miniature Front End Radar Warning Receiver

Technical Data	**RR009**

FEATURES

8 to 18 GHz
-73dBm TSS
40dB logging range
6 bit frequency resolution
Extremely small form factor
Low power consumption



APPLICATIONS

Radar Warning Receiver for:
Personnel
UAV's
Remote sensing

Affordable RWR for air, sea and land platforms

Product Description

The RR009 is designed for Radar Warning Receiver (RWR) applications where small size and low power consumption are of prime importance, with filtering, amplification, detection and frequency measurement being combined into one multi-function unit.

The RR009 brings RWR protection to platforms where it was previously unavailable for reason of cost or size.

Two amplitude measurement channels allow direction finding by amplitude comparison between adjacent antennas. One of these channels is also used in standby mode for detecting the presence of signals by polling round the antennas. A two-tier discriminator, fed from one of the amplitude channels via an SPDT switch, performs frequency measurement on an antenna pair. Frequency resolution is nominally 160 MHz over an 8 to 18 GHz band.

The modular design enables the RWR to be tailored for individual applications, e.g., with or without frequency measurement or 2 or 4 channels.

RF connections are made by SSMA, which can be changed on request to other connector types. Power and data use Nano connectors.

The ultra small size eases the burden on UAV payloads in particular and the low power consumption renders a double benefit, as a smaller, lighter power supply is required.

The RR009 is the leader of a family of products. Development is under way in realising extended frequency and logging range. Please contact the factory with your specific requirement.

Filtronic Components Ltd, Airedale House, Acorn Park, Shipley, West Yorkshire, England BD17 7SW
Tel: +44 1274 531602, fax: +44 1274 595724 • sales@fcl.com • www.filtronic.com

Technical Data — RR009

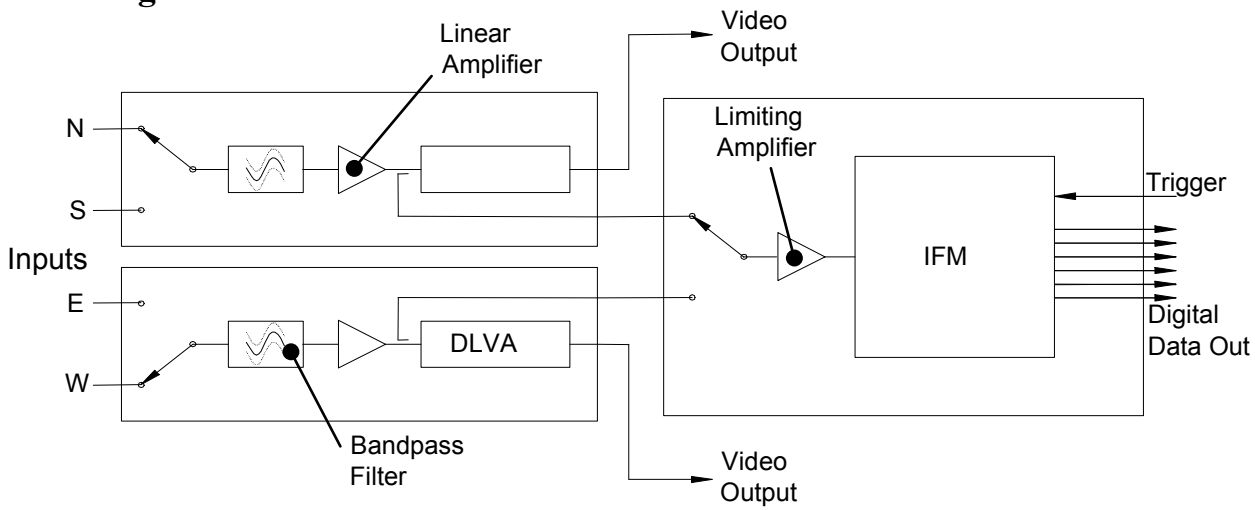
Electrical Specification

Parameter	Amplitude Module	Frequency Module
Operating Frequency	8 to 18 GHz	8 to 18 GHz
Operating Dynamic Range	-73 to 0dBm	-43 to –5 dBm [1]
Frequency Measurement Resolution	-	150 MHz nom.
Frequency Measurement Accuracy	-	<200 MHz r.m.s.
Minimum Pulse Width	-	100 ns
Triggering	-	External Command
Trigger to Data Delay	-	<100 ns max.
Out of Band Rejection	d.c. to 7 GHz > 60 dB 20 to 26 GHz > 30 dB	-
Tangential Signal Sensitivity (8 dB Video SNR)	-73 dBm	-
Logging Range	-70 to -30 dBm	-
Frequency Flatness (Video)	±2.5 dB	-
Amplitude Tracking (Between any Two Modules at the Same Frequency and Temperature)	±1 dB Typical	-
Video Rise Time	30ns Typ 70 ns Max	-
Video Output Slope	50 mV/dB	-
Logging Linearity	±1 dB	-
Video Coupling	Active d.c. restored	-
Maximum Duty Cycle	50 %	-
RF Input Switch Isolation	25 dB min	25 dB min
RF Input Switch Speed	<5 µs	<5 µs
RF Input Switch Control	TTL	TTL
Insertion Gain RF Input to RF Output	27dB nominal	-
Insertion Ripple	±2dB	
Input Return Loss	7dB min (10dB typ)	
Power Supply Current (operating - no rf) See note on page 5	+6 V at 50 mA -6 V at 50 mA +3 V at 130 mA	+6 V at 170 mA -6 V at 20 mA
Power Supply Current (standby) See note on page 5	+6 V at 50 mA -6 V at 50 mA +3 V at 0 mA	+6 V at 120 mA -6 V at 20 mA
Power-up Time (standby to on)	<100 µs	<100 µs
Power-up Time (cold start)	<30ms	<2ms
Temperature Range	-20ºC to +50ºC	-20ºC to +50ºC
Dimensions	4 x 1 x 0.25 inches 101.6 x 25.4 x 6.35 mm	4 x 2 x 0.25 inches 101.6 x 50.8 x 6.35 mm
Weight [2]	50 grams	85 grams
Microwave Input Connector	SSMA Female	Dynawave

1 not including amplitude module gain
2 plus 10 grams for the interconnect module

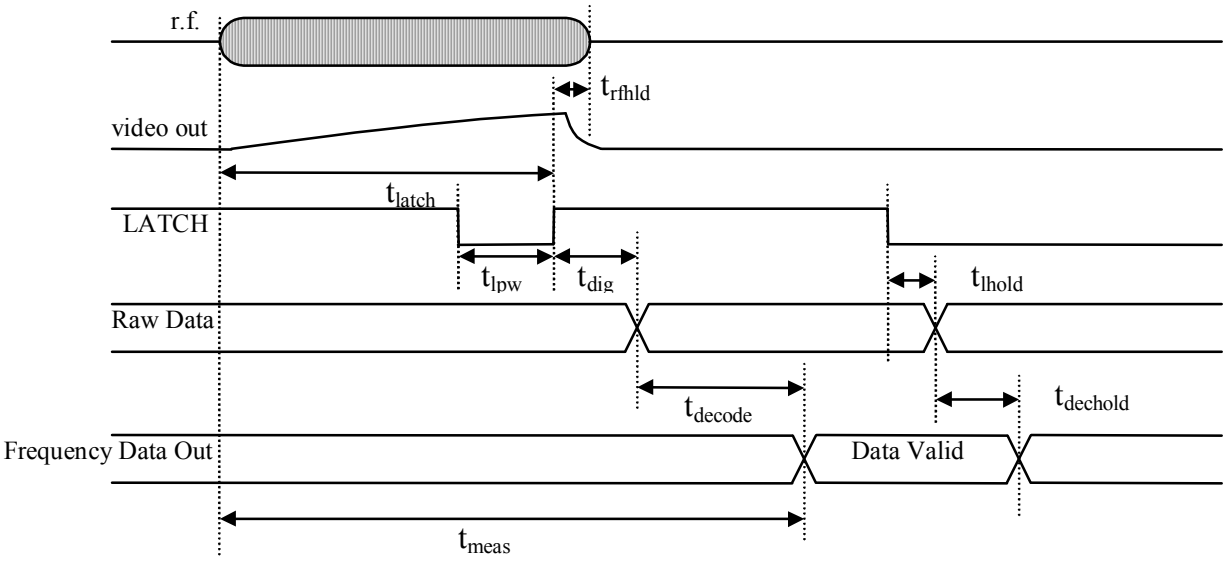
Technical Data | RR009

Block Diagram



Timing

When r.f. enters the discriminator circuits, the video voltages settle after a delay depending on the video bandwidth. The video signals are then stable and can be digitised by the comparators and ASIC. This digitization takes a maximum of 15 ns (ASIC worst case timing). Therefore valid raw frequency data is available 75 ns after the leading edge of the r.f. pulse. The raw frequency data is decoded in the EPROM look-up table which takes 55 ns.

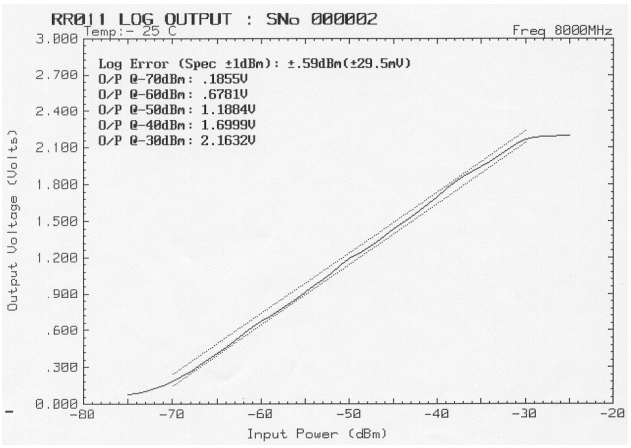


Description	symbol	min	max	units
time between latch edge and trailing edge of r.f	t_{rfhld}	6		ns
time from leading edge of r.f. and latch edge	t_{latch}	60		ns
Width of latch pulse	t_{lpw}	5		ns
time to digitise video	t_{dig}		15	ns
time from latch disable and raw data invalid	t_{lhold}		10	ns
time to decode raw frequency data	t_{decode}		55	ns
time to hold decoded frequency data	$t_{dechold}$		7	ns
time from start of r.f. to valid frequency out	t_{meas}	130		ns

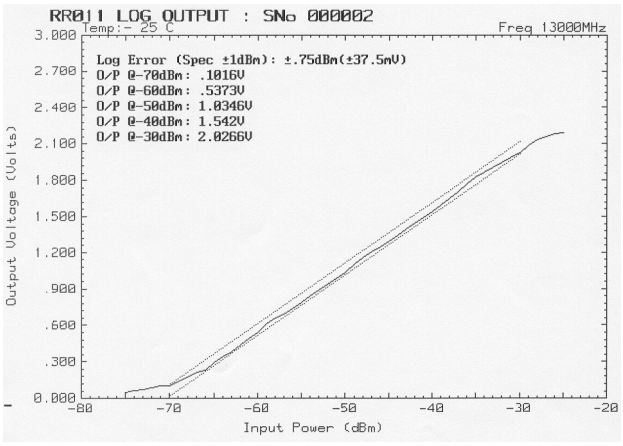
Technical Data

RR009

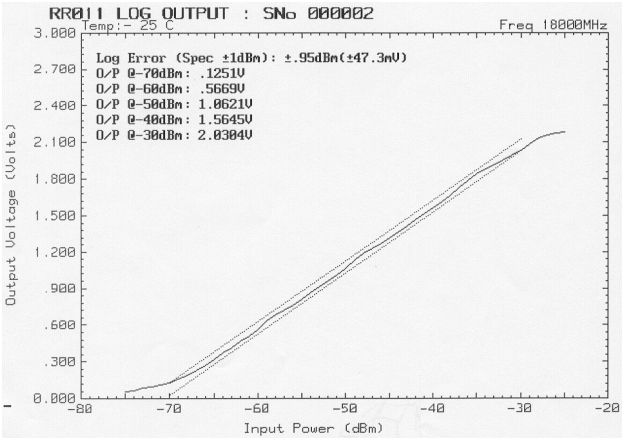
Performance Data



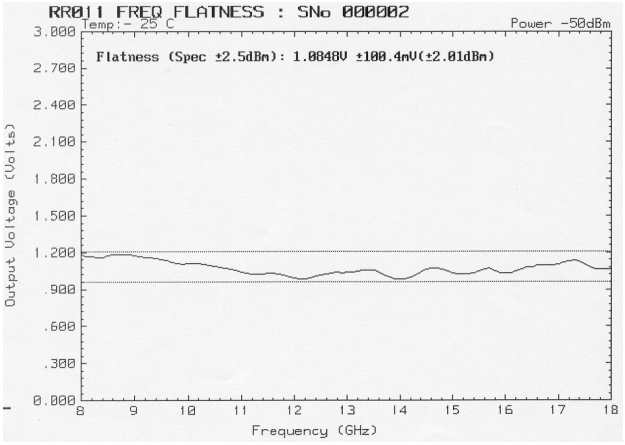
Log plot at 8 GHz



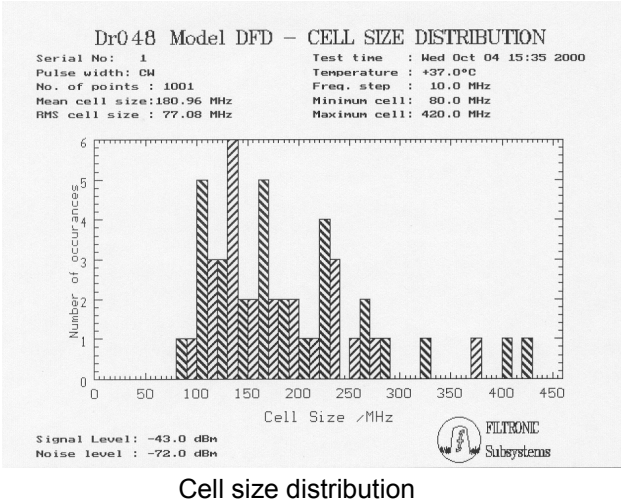
Log plot at 13 GHz



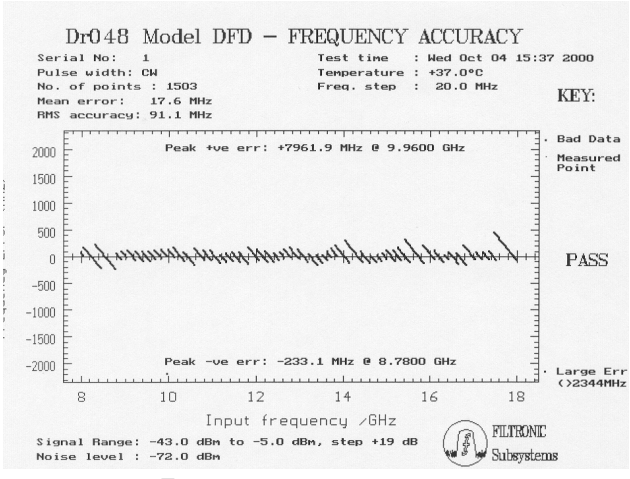
Log plot at 18 GHz



Frequency Flatness at –50dBm input



Cell size distribution



Frequency accuracy

Connector Information

Frequency Module Connector

The Frequency Measurement Module connector is a 15 way Nanonics® Dualobe® single row receptacle. The mating part is a 15 way single row plug with wire leads. Example part number: SSM015PC2DC012N

Pin	Type	Signal
1	POWER	+6V
2	POWER	+6V
3	POWER	-6V
4	IN TTL	Input Select
5	OUT TTL	D0
6	OUT TTL	D1
7	OUT TTL	D2
8	OUT TTL	D3
9	OUT TTL	D4
10	OUT TTL	D5
11	OUT TTL	Out Of Band Flag
12	IN TTL	Latch
13	IN TTL	Standby (active low)
14	POWER	GND
15	POWER	GND

Amplitude Module Connector

The Amplitude Measurement Module connector is a 9 way Nanonics® Dualobe® single row receptacle. The mating part is a 9 way single row plug with wire leads. Example part number: SSM009PC2DC012N

Pin	Type	Signal
1	POWER	+6V
2	POWER	+3V (optional amplifier bias)
3	IN TTL	Channel Select
4	IN TTL	Standby (active low)
5	POWER	-6V
6	RESERVED	Do Not Connect
7	GND	Ground
8	OUTPUT	Video Output
9	GND	Ground

Note:
The microwave amplifier in the amplitude module may be biased in three factory configurable ways.
1 The bias can be internally developed using a switching power supply which can degrade sensitivity but has advantages of optimum power consumption and ease of interface,
2 The bias can be internally developed using a linear regulator for optimum sensitivity and ease of interface at the cost of increased power consumption.
3 The bias can be directly supplied as +3V for optimum sensitivity and power consumption .

Ask factory for further details.

Technical Data | RR009

Outline Drawing