



**TELEDYNE
DEFENCE**

A Teledyne Technologies Company

2 to 18GHz Instantaneous Frequency Measurement Unit

Technical Data **DR024-F2**



Features

- 12 Bit resolution
- External trigger
- 50ns pulse capable
- 16GHz Instantaneous bandwidth
- 50dBm sensitivity
- Small form factor
- Low weight
- Low power consumption

Applications

- Electronic support measures (ESM)
- Radar warning receivers (RWR)
- ECM set-on
- Airborne, fixed wing & rotary
- Land
- Naval

Product Description

The DR024-F2 uses proprietary Teledyne Defence technology to provide state of the art performance in a package measuring 152mm x 147mm x 30mm weighing 1.45kg.

The DR024-F2 is an externally triggered IFM, providing a digital 12-bit output word of the RF input with every sample. The internal analogue bandwidth is sufficient to capture a 50ns pulse.

With a resolution of 12 bits, the DR024-F2 gives a nominal frequency resolution of 3.93MHz and an rms accuracy of ≤ 4.5 MHz with an SNR of 3dB or better.

Designed specifically for fast jet applications this product will withstand the most demanding of environments. It is characterised for -40°C to $+85^{\circ}\text{C}$. For applications outside this range, please contact the Sales Dept.

External connections are made via a 51 way high density D type for power and digital I/O and SMA for the RF input.

This product is recommended for new designs. Other IFM configurations are available; please contact the Sales Dept for further information.

Global Defence & Security Solutions

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Electrical Specification

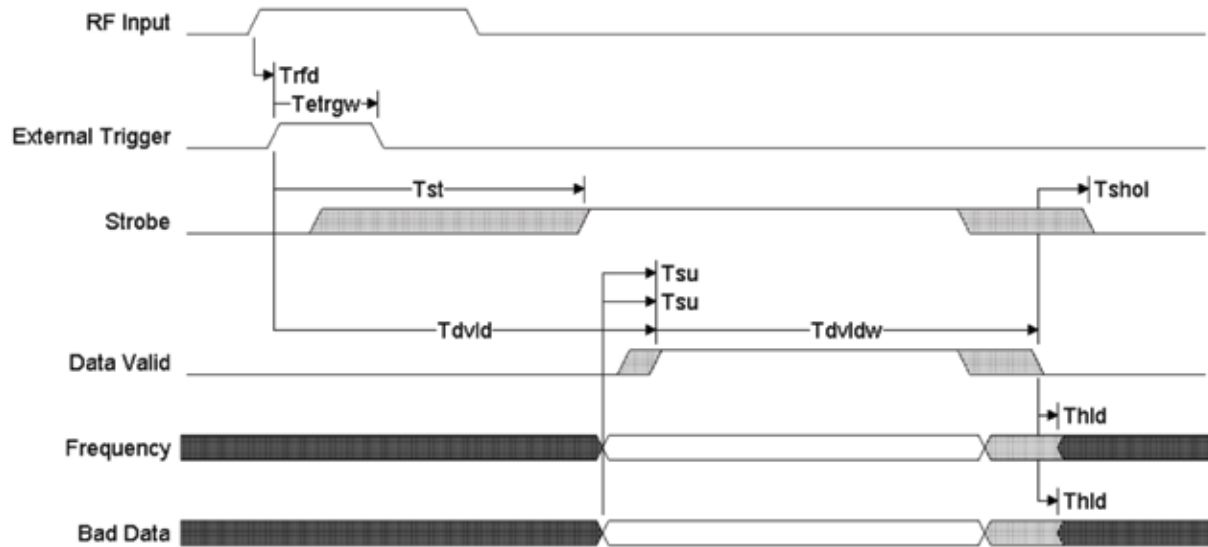
Ref	Parameter	Units	Value			Notes
			Min	Nom	Max	
1	Operating Frequency Range	GHz	1.955		18.045	
2	Unambiguous Bandwidth	GHz	1.5		18.5	
3	Frequency Resolution	MHz		3.93		1
4	Digital Frequency Resolution	Bits		12		
5	Throughput Time	ns	330		370	2
6	RF Input Dynamic Range	dBm	-50		10	
7	RF Input Signal/Noise Ratio	dB	3			3
8	RF Input Pulse Width	ns	50		CW	4
9	Recovery Time	ns			50	5
10	RF Input VSWR				2.2:1	
11	Frequency Error (RMS) at 3 dB SNR	MHz			4.5	6
12	Frequency Peak Error at 3 dB SNR	MHz		15		
13	Peak Error Rate at 3 dB SNR	%			0.04	7
14	Bad Data Error Rate at 3 dB SNR	%			2	8
15	Simultaneous Signal: Level	dBc	10			9
16	Simultaneous Signal: Frequency Separation	MHz		100		9
17	Overload Power	dBm			20	10
18	Temperature Range (operating)	°C	-40		85	
19	Power Consumption	Watts			18.5	
20	Power Supply Current: +15v Rail	mA			850	
21	Power Supply Current: +5v Rail	mA			1000	
22	Weight (Approx.)	kg			1.55	

- Nominal frequency resolution is unambiguous bandwidth divided by number of bits.
- See timing diagrams.
- Minimum SNR required for nominal operation.
- Minimum pulse width is defined by internal video bandwidth.
- Given as the maximum time required between the removal of a pulse of RF at any power within the operating dynamic range and the arrival of the next pulse to ensure the correct measurement of the second pulse.
- The actual resolution, i.e., the change of frequency required to change 1 bit of the output word varies with frequency. The rms accuracy is calculated as the standard deviation of the frequency distribution. The rms accuracy is specified for 3dB. The rms error excludes those measurements that are flagged as "bad data".
- The percentage number of measurements that exceed the peak error frequency.
- The percentage number of measurements that cause the "bad data" signal to be asserted.
- Simultaneous signals are defined as signals which overlap by at least 30ns during a measurement cycle. A valid measurement will be made on the larger of two signals provided that a) the amplitude difference between them is 10dB and b) there is at least 100MHz frequency separation.
- Maximum input power without damage.



Timing Information

Operation with external trigger

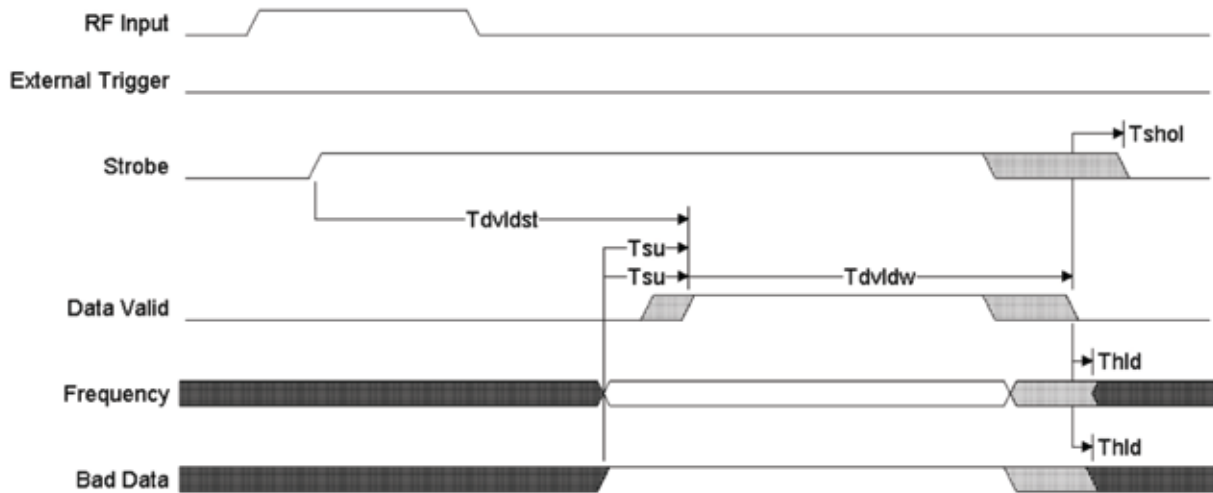


Parameter	Description	Timings	
		Min	Max
Trfd	Delay from RF to External Trigger	4 ns	12 ns
Tetrgw	External Trigger width	50 ns	
Tst	Delay from External Trigger to Strobe	40 ns	300 ns
Tdvid	Delay from External Trigger to data Valid	330 ns	370 ns
Tdvidw	Data Valid width	330 ns	370 ns
Tsu	Data set up time w.r.t. Data Valid	20 ns	
Thld	Data hold time w.r.t. Data Valid	20 ns	
Tshol	Strobe hold time w.r.t. Data Valid	0 ns	



Timing Information

Strobe only, no external trigger:



Parameter	Description	Timings	
		Min	Max
Tdvdst	Delay from Strobe to data Valid	320 ns	360 ns
Tdvdw	Data Valid width	330 ns	370 ns
Tsu	Data set up time w.r.t. Data Valid	20 ns	
Thld	Data hold time w.r.t. Data Valid	20 ns	
Tshol	Strobe hold time w.r.t. Data Valid	0 ns	



Pin Designations

Pin	Signal	Direction
1	+15V	Power
2	+15V	Power
3	+15V	Power
4	0V	Return
5	Not Used	
6	0V	Return
7	External Trig	Input
8	0V	Return
9	Strobe	Input
10	0V	Return
11	Data Valid +	Output
12	Data Valid -	Output
13	0V	Return
14	Not Used	
15	Not Used	
16	0V	Return
17	Bad Data -	Output
18	Bad Data +	Output
19	0V	Return
20	Not Used	
21	Not Used	
22	Not Used	
23	Not Used	
24	+5V	Power
25	+5V	Power
26	+5V	Power
27	Freq 11+	Output
28	Freq 11 -	Output
29	Freq 10+	Output
30	Freq 10 -	Output
31	Freq 9+	Output
32	Freq 9 -	Output
33	Freq 8+	Output
34	Freq 8 -	Output
35	Freq 7+	Output
36	Freq 7 -	Output
37	Freq 6+	Output
38	Freq 6 -	Output
39	Freq 5 +	Output
40	Freq 5 -	Output
41	Freq 4+	Output
42	Freq 4 -	Output
43	Freq 3+	Output
44	Freq 3 -	Output
45	Freq 2+	Output
46	Freq 2 -	Output
47	Freq 1 +	Output
48	Freq 1 -	Output
49	Freq 0+	Output
50	Freq 0 -	Output
51	0V	Return



Environmental Screening

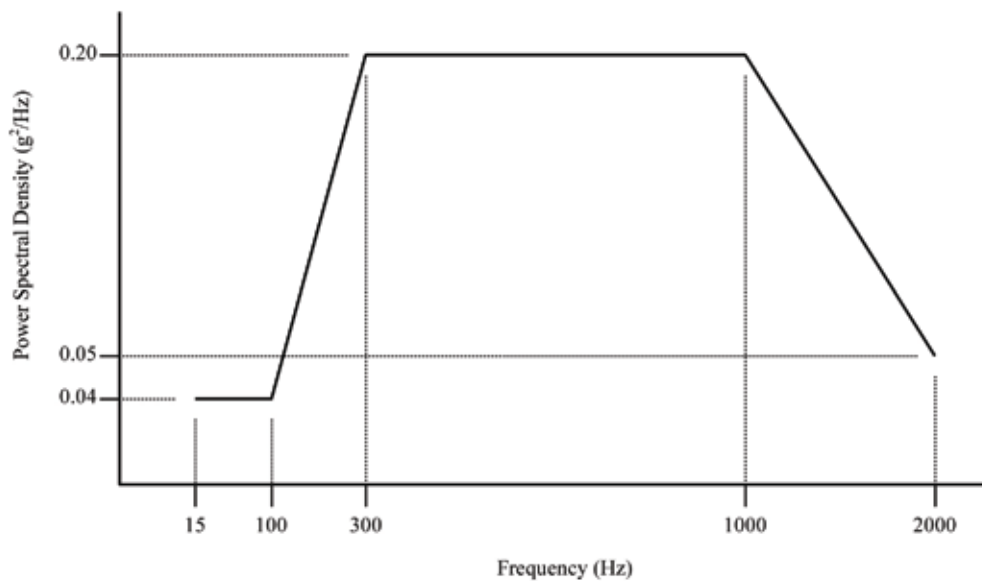
100% of units subjected to: burn in 8 hours operational at 71°C, random vibration (as below), 5min per axis, thermal shock (as below), random vibration (as below), 5min per axis.

Environmental Data

Compliance can be shown by similarity to the following environmental conditions

Sinusoidal Vibration: MIL-STD-202F, Method 204 - 5g profile between 5 and 104Hz for 90 min per axis

Random Vibration: MIL-STD-810D, Method 514.3 – specified profile (below) with max of 0.2g²/Hz for 60 min per axis, 20 to 2000Hz



Mechanical Shock: MIL-STD-202F, Method 213B – 15g/11ms, 3 shocks in each axis in each direction (18 total)

Acceleration: MIL-STD-202F, Method 212A, condition B, 6 to 14g

High Temperature storage: MIL-STD-810D, Method 501.2 - 95°C for 8 hours

High Temperature operational: MIL-STD-820D, Method 501.2 – 71°C / 30min, 60°C / 60min, 55°C / 4hr

Thermal Shock: 10 Cycles of –40°C to 71°C, 5 min ramp, 2hr dwell

Low Temperature storage: MIL-STD-810D, Method 502.2 - -54°C for 8hours.

Low temperature operational: MIL-STD-810D, Method 502.2 - -40°C / 60min.

Combined temperature, altitude & humidity: MIL-STD-810D. Method 520 – temperature –40°C to 70°C, storage condition sea level to 17000m (87.6mb), operating condition sea level to 11000m (228mb), relative humidity at sea level 75%, 10 Cycles.

Humidity: MIL-STD-810D, Method 507.2, procedure 2 – RH 85% to 95%, temperature 30°C to 60°C, 24 hour cycle, 10 cycles.

EMI/EMC: Generally in accordance with MIL-STD-461E. Please note that system precautions must be taken to prevent interfering signals entering the high gain RF front end.



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