

# Plug-In Phase Detector

50Ω High Output 1 to 100 MHz

MPD-1+



Generic photo used for illustration purposes only

CASE STYLE: A11

**+RoHS Compliant**

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

## Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Input Power	50mW
Peak IF current	20mA

Permanent damage may occur if any of these limits are exceeded.

## Pin Connections

RF REF (RF2)	8
RF IN (RF1)	1
DC OUT (I)	3,4^
GROUND	2,5,6,7
CASE GROUND	2

^ pins must be connected together externally

## Features

- wideband, 1 to 100 MHz
- hermetic case
- low DC offset, 0.2 mV typ.
- high DC output, 1000 mV typ.
- high isolation, 40 dB min.

## Applications

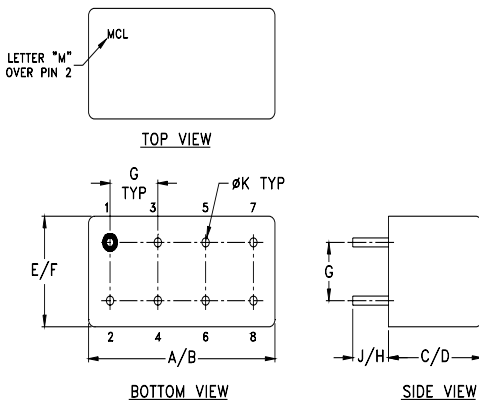
- monitoring circuits
- leveling circuits
- PLL

## Phase Detector Electrical Specifications

FREQUENCY (MHz)	POWER IN RF1 RF2 (dBm)	SCALE FACTOR (mV/deg.)	IMPEDANCE (ohms) Output Load I	ISOLATION (dB) RF1/RF2 Min.	OUTPUT POLARITY RF1/RF2 In-Phase	DC OUTPUT (mV)		FIGURE OF MERIT Typ.	
						Max. Typ.	Offset Typ. Max.		
1-100	DC-50	7	8	500	40	neg.	1000 700	0.2 1	143

DC output decreases to 550mV over 1-10 MHz as temperature decreases to -55°C

## Outline Drawing

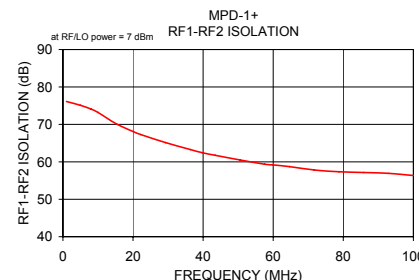
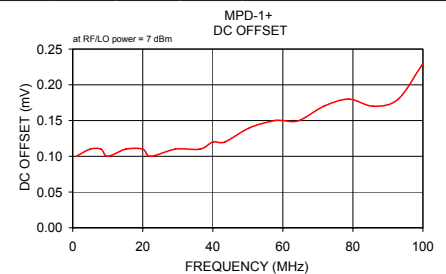
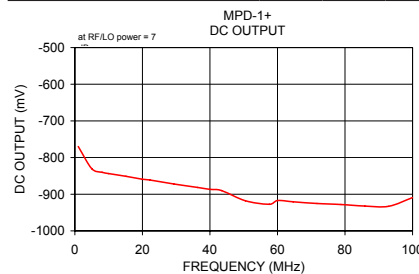


## Outline Dimensions (inch/mm)

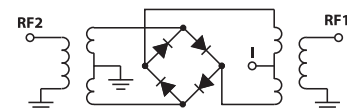
A	B	C	D	E	F
.480	.500	.240	.255	.210	.230
12.19	12.70	6.10	6.48	5.33	5.84
G	H	J	K		wt
.100	.20	.14	.020		grams
2.54	5.08	3.56	0.51		1.9

## Typical Performance Data

Frequency (MHz)	DC Output mV		DC Offset mV		RF1-RF2 Isolation (dB)
	$\bar{X}$	$\sigma$	$\bar{X}$	$\sigma$	
1.00	-769.98	14.85	0.10	0.16	76.12
5.00	-830.34	8.90	0.11	0.18	75.09
8.07	-840.24	14.44	0.11	0.18	74.07
10.00	-843.71	14.61	0.10	0.18	73.19
15.14	-851.12	17.01	0.11	0.19	70.19
20.00	-859.20	18.91	0.11	0.19	68.10
22.21	-861.26	20.52	0.10	0.20	67.28
29.29	-872.02	22.55	0.11	0.21	65.14
36.36	-881.57	24.77	0.11	0.22	63.29
40.00	-886.86	25.39	0.12	0.23	62.38
43.43	-889.93	26.41	0.12	0.23	61.76
50.50	-917.82	25.99	0.14	0.25	60.51
57.57	-927.50	28.69	0.15	0.27	59.35
60.00	-917.14	33.08	0.15	0.26	59.18
64.64	-920.62	38.60	0.15	0.27	58.73
71.71	-925.22	45.18	0.17	0.31	57.82
78.79	-928.03	51.83	0.18	0.31	57.35
85.86	-932.34	57.31	0.17	0.31	57.15
92.93	-932.98	60.65	0.18	0.38	56.93
100.00	-909.17	74.27	0.23	0.43	56.36



## electrical schematic



## Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



# Phase Detector (High DC Output)

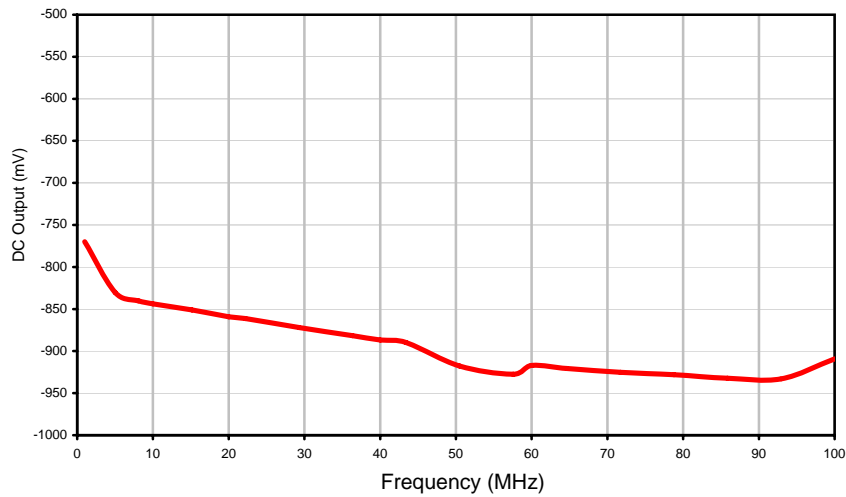
# MPD-1+

## Typical Performance Data

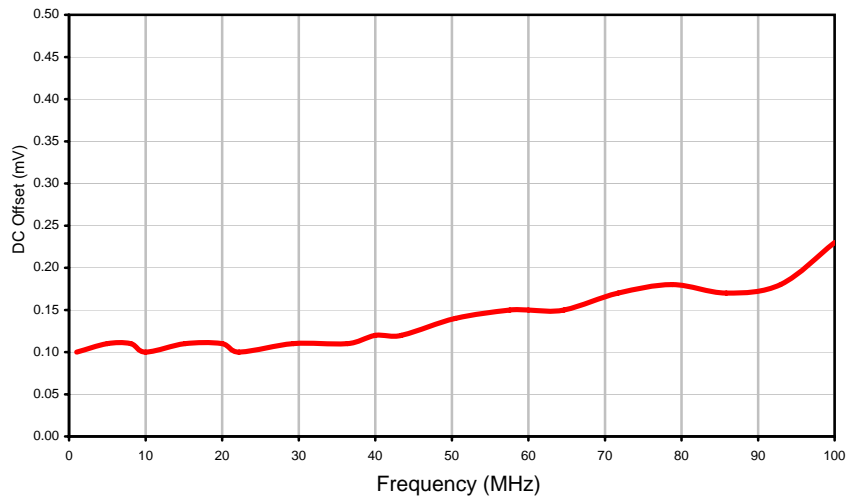
FREQUENCY (MHz)	DC OUTPUT (mV)	DC OFFSET (mV)	RF1-RF2 ISOLATION (dB)
1.00	-769.98	0.10	76.12
5.00	-830.34	0.11	75.09
8.07	-840.24	0.11	74.07
10.00	-843.71	0.10	73.19
15.14	-851.12	0.11	70.19
20.00	-859.20	0.11	68.10
22.21	-861.26	0.10	67.28
29.29	-872.02	0.11	65.14
36.36	-881.57	0.11	63.29
40.00	-886.86	0.12	62.38
43.43	-889.93	0.12	61.76
50.50	-917.82	0.14	60.51
57.57	-927.50	0.15	59.35
60.00	-917.14	0.15	59.18
64.64	-920.62	0.15	58.73
71.71	-925.22	0.17	57.82
78.79	-928.03	0.18	57.35
85.86	-932.34	0.17	57.15
92.93	-932.98	0.18	56.93
100.00	-909.17	0.23	56.36

## Typical Performance Curves

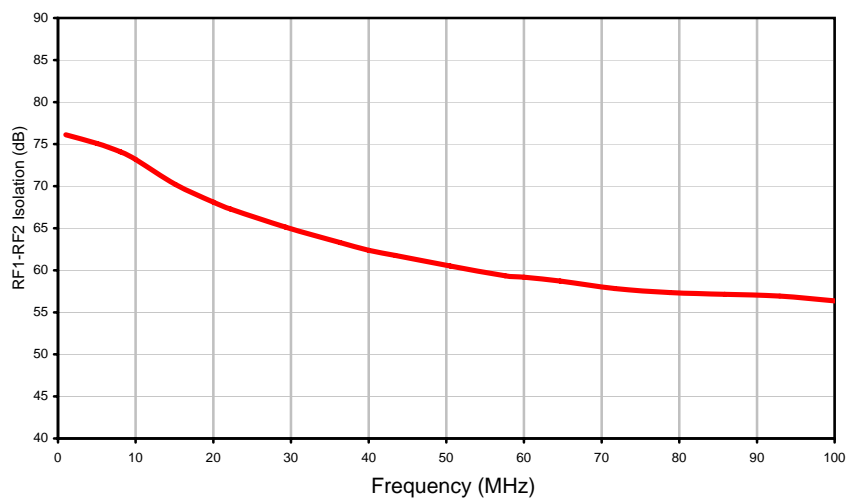
### DC Output



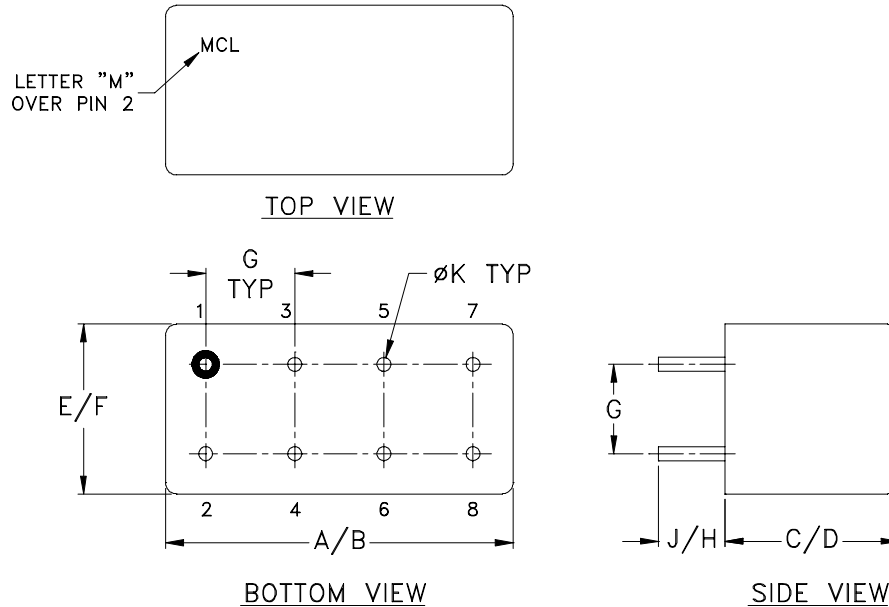
### DC Offset



### RF1-RF2 Isolation



## Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	WT, GRAM
A03	.480	.500	.390 (9.91)	.405 (10.29)	.210 (5.33)	.230 (5.84)	.100 (2.54)	.20 (5.08)	.14 (3.56)	.020 (.51)	2.3
A11	(12.19)	(12.70)	.240 (6.10)	.255 (6.48)							1.9

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3 Pl.  $\pm .015$

### Notes:

- Header material: C.R.S.  
Pin material: #52 alloy.  
Cover material: Cupro-Nickel.
- Pin finish: Electro Tin-Silver.
- Insulated spacer available. Request P/N B14-047-01.
- Tolerance on pin diameter  $\pm .005$  inch.
- Glass meniscus 0.015 inch max.
- Blue bead indicates Pin 1. Pin numbers do not appear on unit, for reference only.



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Moisture Resistance	10 cycles, 24 hours per cycle	MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours
Solderability	10X Magnification	J-STD-002, 95% Coverage
Resistance to Solder Heat	260°C for 10 seconds	MIL-STD-202, Method 210, Condition B
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215
Terminal Strength	4 1/2 Pound Pull	MIL-STD-202, Method 211, Condition A



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Gross Leak	125°C Bubble Test	MIL-STD-202, Method 112, Condition D
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D