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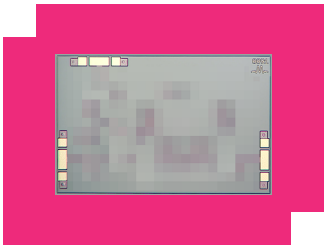
MDPX-00002CH

Passive MMIC Diplexer

DEVICE OVERVIEW

General Description

The MDPX-00002CH is a broadband passive MMIC diplexer, a combination low pass and high pass filters, capable of multiplexing low pass DC - 35.0 GHz and high pass 43.3 - 59.9 GHz signals. Passive GaAs MMIC technology allows production of smaller filter constructions that replace larger form factor circuit board constructions. Tight fabrication tolerances allow for less unit-to-unit variation than traditional filter technologies. Low unit to unit variation allows for accurate simulations using the provided S3P file taken from measured production units.



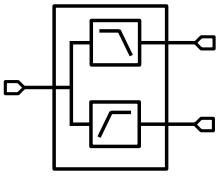
Features

- 40 GHz Crossover Point
- Low 0.4 dB LPF and 2 dB HPF typical Insertion Loss in Pass Band
- High Stop Band Suppression
- Excellent Return Loss

Applications

N/A

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MDPX-00002CH	Passive MMIC Diplexer	CH	RoHS REACH	Released	EAR99

Table Of Contents

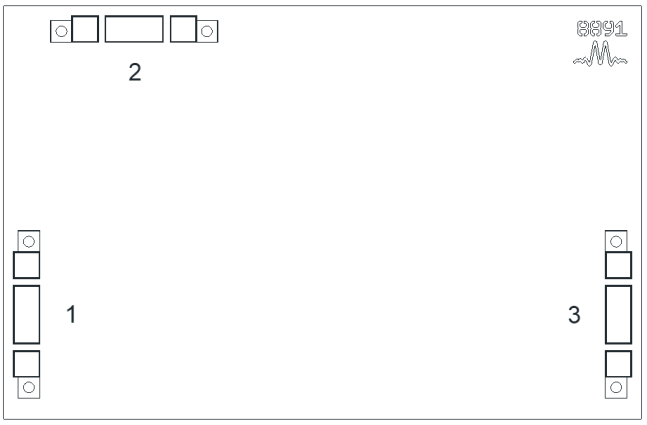
Revision History

Revision Code	Revision Date	Comment
-	2023-08-30	Datasheet Initial Release
A	2024-01-05	Updated Production Test Criteria
B	2024-02-20	Updated Package Dimension

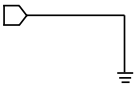
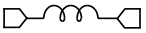
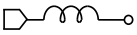
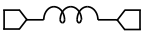
Port Configuration and Functions

Port Diagram

A top-down view of the MDPX-00002CH package outline drawing is shown below.



Port Functions

Port	Function	Description	DC Equivalent Circuit
GND	Ground	CH package ground path is provided through the substrate and ground bond pads.	
Pad 1	Input/common	Pad 1 is the common port. This pad is DC short to Pad 3 and DC open to Pad 2.	
Pad 2	High Pass Filter	Pad 2 is the high pass filter. This pad is DC open to ground and all other pads.	
Pad 3	Low Pass Filter	Pad 3 is the low pass filter. This pad is DC short Pad 1 and is DC open to Pad 2.	

Specifications

Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may be inoperable or have a reduced lifetime.

Parameter	Maximum Rating	Unit
DC Current, at any Port	500	mA
Maximum Operating Temperature	100	°C
Maximum Storage Temperature	125	°C
Minimum Operating Temperature	-55	°C
Minimum Storage Temperature	-65	°C

Package Information

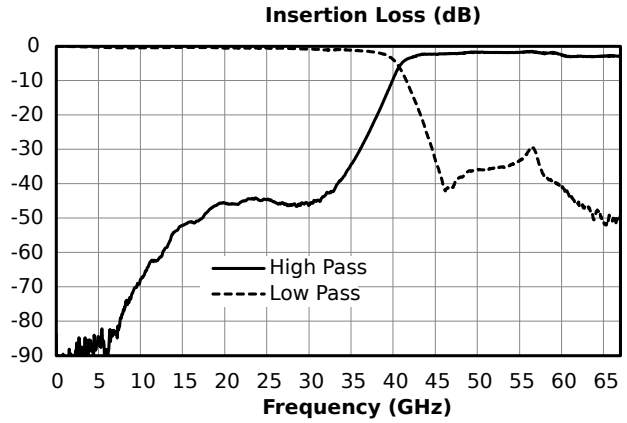
Parameter	Details	Rating
Dimensions	-	1.55 x 2.40 mm

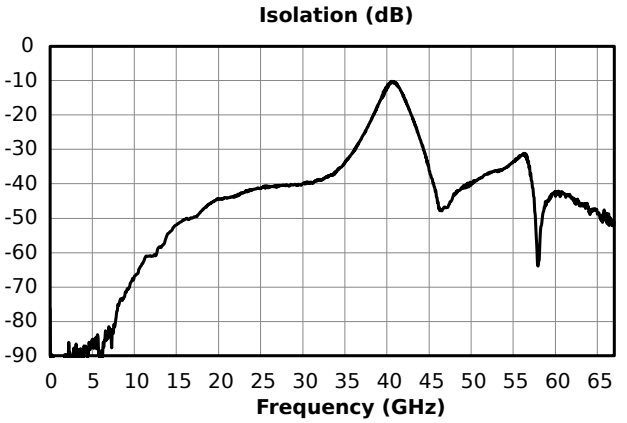
Electrical Specifications

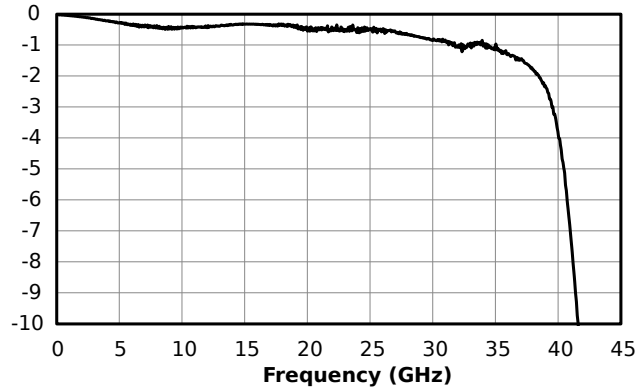
The electrical specifications apply at TA=+25°C in a 50Ω system. Min and Max limits are guaranteed at TA=+25°C. All bare die are 100% visually inspected and RF performance is guaranteed by sample testing.

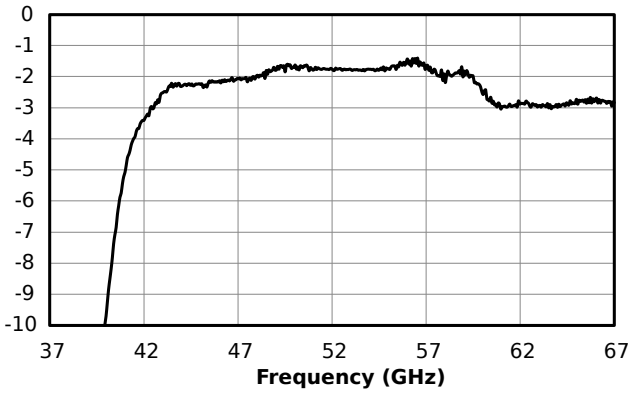
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
1 dBc High Passband	-	-	-	43.3	-	59.9	GHz
1 dBc Low Passband	-	-	-	0	-	35	GHz
3 dBc High Passband	-	-	-	41.3	-	67	GHz
3 dBc Low Passband	-	-	-	0	-	39.8	GHz
Common Port Return Loss	-	43.3	59.9	-	23	-	dB
Common Port Return Loss	-	0	35	-	22	-	dB
Group Delay, High Band	-	43.3	59.9	-	61	-	ps
Group Delay, Low Band	-	0	35	-	22	-	ps
High Pass Filter, Pass Band Insertion Loss	-	43.3	59.9	-	2	-	dB
High Pass Filter, Pass Band Return Loss	-	43.3	59.9	-	22	-	dB
Impedance	-	-	-	-	50	-	Ω
Isolation	-	43.3	67	-	41	-	dB
Isolation	-	0	38.1	-	44	-	dB
Low Pass Filter, Pass Band Return Loss	-	0	35	-	0	-	dB
Low Pass Filter, Pass Band Return Loss	-	0	35	-	21	-	dB
Stopband Suppression, High Band	-	0	38.1	-	46	-	dB
Stopband Suppression, Low Band	-	43.3	67	-	36	-	dB

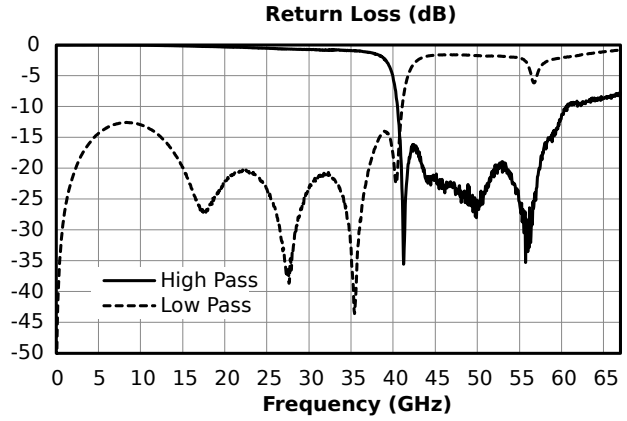
Typical Performance Plots

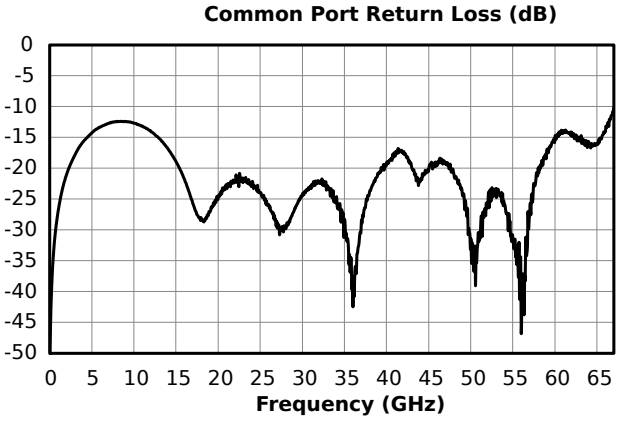


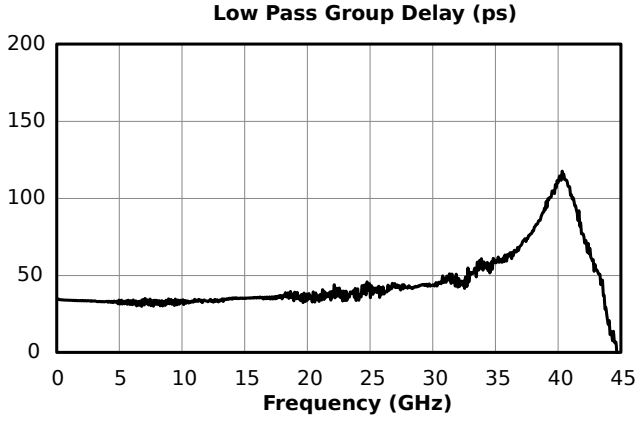


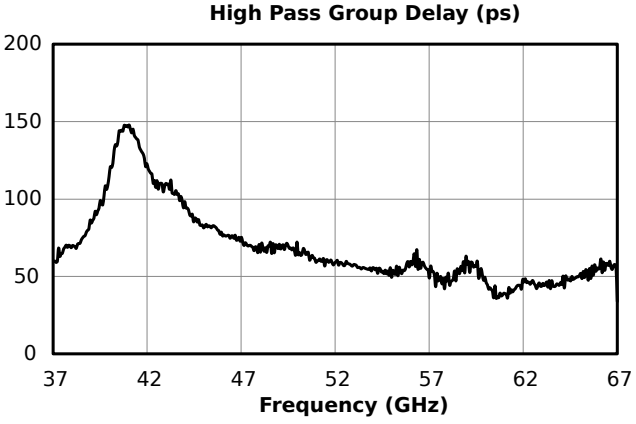












Die Mounting Recommendations

Mounting and Bonding Recommendations

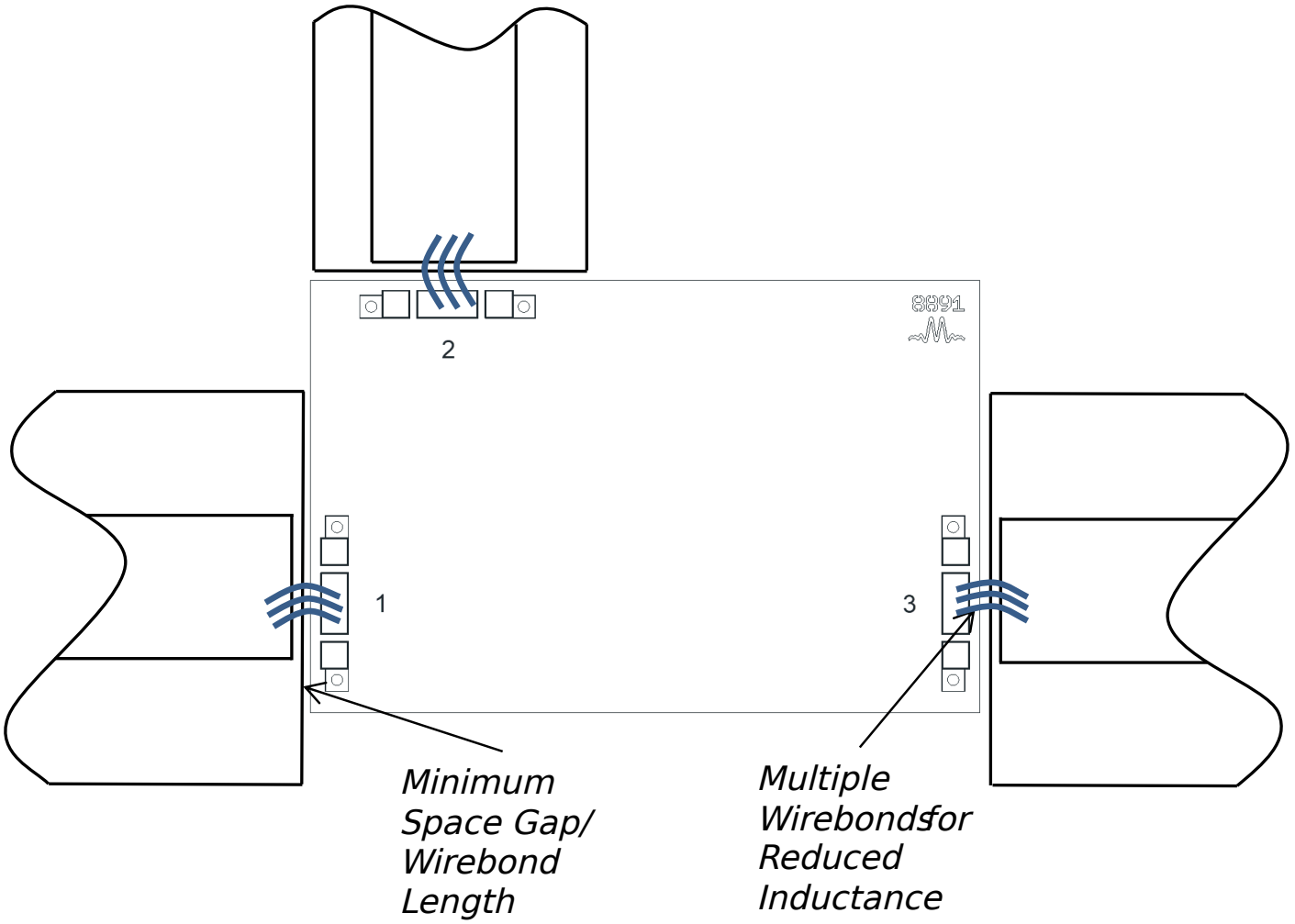
Marki MMICs should be attached directly to a ground plane with conductive epoxy. The ground plane electrical impedance should be as low as practically possible. This will prevent resonances and permit the best possible electrical performance. Datasheet performance is only guaranteed in an environment with a low electrical impedance ground.

Mounting - To epoxy the chip, apply a minimum amount of conductive epoxy to the mounting surface so that a thin epoxy fillet is observed around the perimeter of the chip. Cure epoxy according to manufacturer instructions.

Wire Bonding - Ball or wedge bond with 0.025 mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. All bonds should be as short as possible <0.31 mm (12 mils).

Circuit Considerations – 50 Ω transmission lines should be used for all high frequency connections in and out of the chip. Wirebonds should be kept as short as possible, with multiple wirebonds recommended for higher frequency connections to reduce parasitic inductance. In circumstances where the chip more than .001” thinner than the substrate, a heat spreading spacer tab is optional to further reduce bondwire length and parasitic inductance.

Bonding Diagram



Handling Precautions

General Handling
Chips should be handled with care using tweezers or a vacuum collet. Users should take precautions to protect chips from direct human contact that can deposit contaminants, like perspiration and skin oils on any of the chip's surfaces.

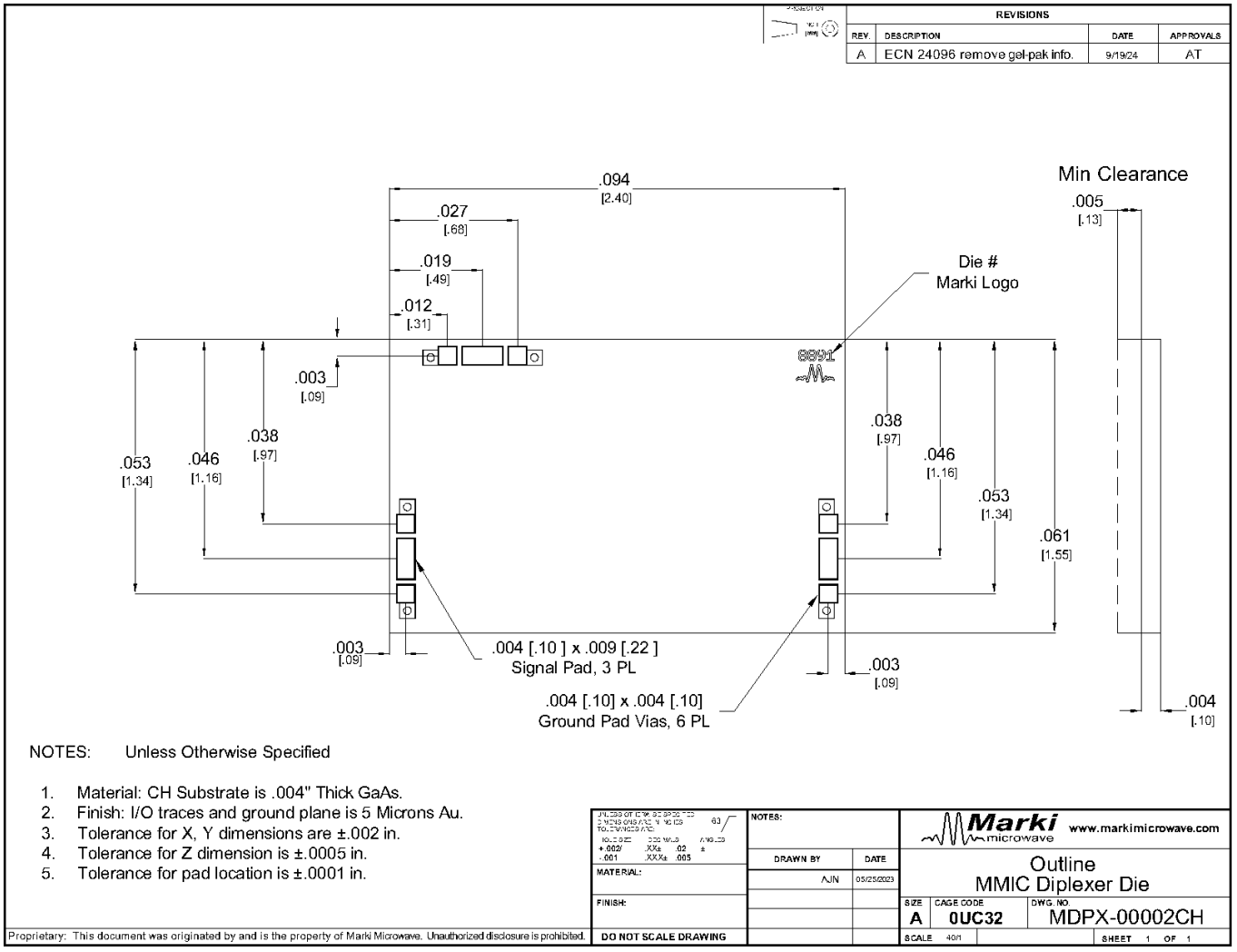
Static Sensitivity
GaAs MMIC devices are sensitive to ESD and should be handled, assembled, tested, and transported only in static protected environments.

Cleaning and Storage: Do not attempt to clean the chip with a liquid cleaning system or expose the bare chips to liquid. Once the ESD sensitive bags the chips are stored in are opened, chips should be stored in a dry nitrogen atmosphere.

Mechanical Data

Outline Drawing

Download : Outline 2D Drawing



NOTES: Unless Otherwise Specified

1. Material: CH Substrate is .004" Thick GaAs.
2. Finish: I/O traces and ground plane is 5 Microns Au.
3. Tolerance for X, Y dimensions are ±.002 in.
4. Tolerance for Z dimension is ±.0005 in.
5. Tolerance for pad location is ±.0001 in.

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