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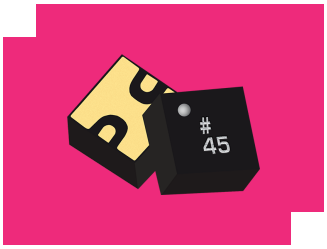
MEQ9-20CSP1

Chip Scale Package MMIC 20 GHz 9 dB Equalizer

DEVICE OVERVIEW

General Description

The MEQ9-20CSP1 is a passive MMIC equalizer CSP ideal for compensating for low pass filtering effects in RF/microwave and high speed digital systems. The MEQ9-20CSP1 provides 8.5dB positive slope equalization from DC to 20GHz with a DC attenuation of 9dB. The chip scale package allows for extreme miniaturization of the SMT footprint. The unique design offers superior 25dB return loss to competitors in an extremely small footprint. GaAs MMIC technology provides consistent unit-to-unit performance in a small, low cost form factor.



Download s-parameters here

Features

- Small 1.5 x 1.5 mm package size
- DC attenuation of 9dB
- Typical Insertion Loss 0.5dB at 20GHz
- Typical VSWR of 1.12 Over Operating Band
- Low SWaP
- This product embodies Marki Microwave's U.S. Pat. 11,869,858.

Applications

- RF Transceivers
- High-Speed Data
- Telecom
- Cable Loss Compensation
- Amplifier Compensation

Functional Block Diagram

Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MEQ9-20CSP1	Chip Scale Package MMIC 20 GHz 9 dB Equalizer	CSP1	REACH RoHS	Released	EAR99
EVB-MEQ9-20	Evaluation Board, Chip Scale Package MMIC 20 GHz Equalizer	EVB	REACH RoHS	Released	EAR99

Table Of Contents

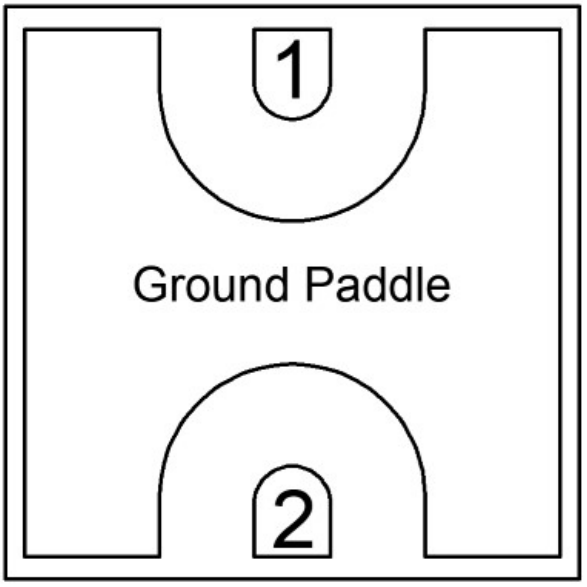
Revision History

Revision Code	Revision Date	Comment
-	2025-06-13	Initial Release

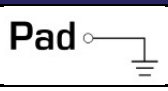
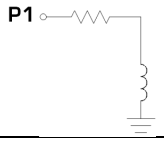
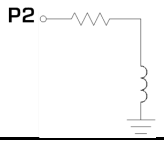
Port Configuration and Functions

Port Diagram

An x-ray view of the MEQ9-20CSP1 package outline drawing is shown below. The MEQ equalizers are symmetrical allowing Port 1 or Port 2 to be used as the input.



Port Functions

Port	Function	Description	DC Equivalent Circuit
GND	Ground	SM package ground path is provided through the ground paddle.	
Pin 1	Input/Output	Pin 1 is DC connected to ground through a resistor. DC block is required if voltage present.	
Pin 2	Input/Output	Pin 2 is DC connected to ground through a resistor. DC block is required if voltage present.	

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
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
ESD	250 to < 500 Volts	HBM Class 1A
Weight	Package name: CSP1	0.04g
Dimensions	-	1.50 x 1.50 mm
Moisture Sensitivity Level	-	MSL 3

Electrical Specifications

The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data shown is for the equalizer in a SM package with a sine wave input applied to port 1. Min and Max limits are guaranteed at TA=+25°C. All bare die are 100% DC tested and visually inspected.

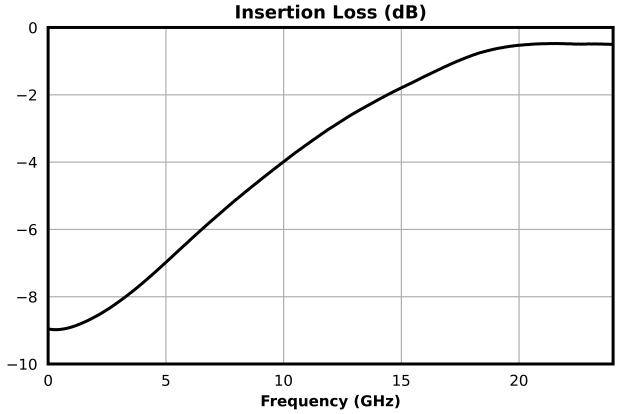
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Insertion Loss at DC	Configuration A, Temp = 25°C	0	0	-	9.0	-	dB
Insertion Loss	Configuration A, Temp = 25°C	10	10	-	4.0	-	dB
Insertion Loss	Configuration A, Temp = 25°C	20	20	-	0.5	-	dB
Equalization Value [1]	Configuration A, Temp = 25°C	0	20	-	8.5	-	dB
Return Loss	Configuration A, Temp = 25°C	0	20	-	25	-	dB
Group Delay	Configuration A, Temp = 25°C	0	20	-	16	-	ps

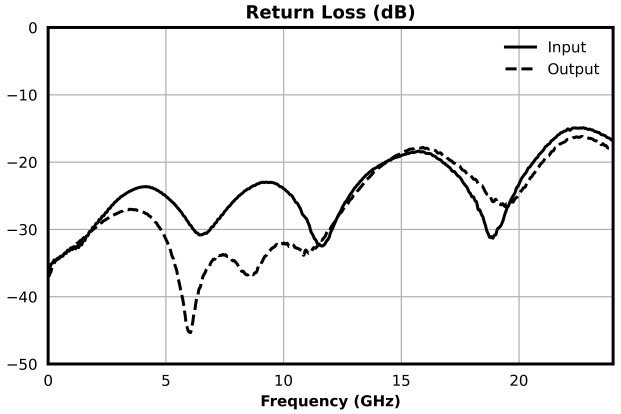
[1] Equalization Value = Max Insertion Loss - Min Insertion Loss
Equalizer is symmetrical. Reverse measurement is equivalent to forward measurement. All measurements taken in EVB package and de-embedded to the CSP1 pad interface.

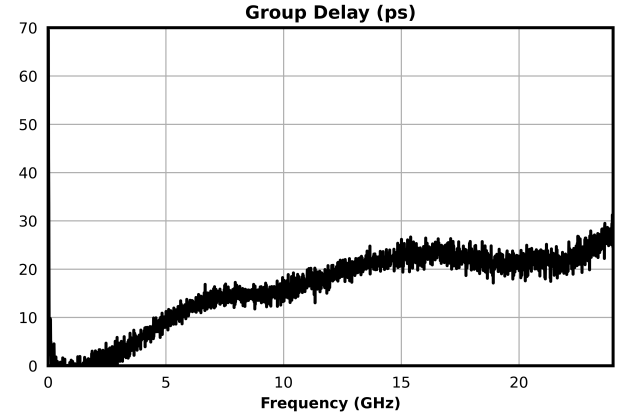
MEQ9-20CSP1

Chip Scale Package MMIC 20 GHz 9 dB Equalizer

Typical Performance Plot







MEQ9-20CSP1

Chip Scale Package MMIC 20 GHz 9 dB Equalizer

Mechanical Data

Outline Drawing

Download : Outline 2D Drawing | Outline 3D Drawing | Outline 3D STP

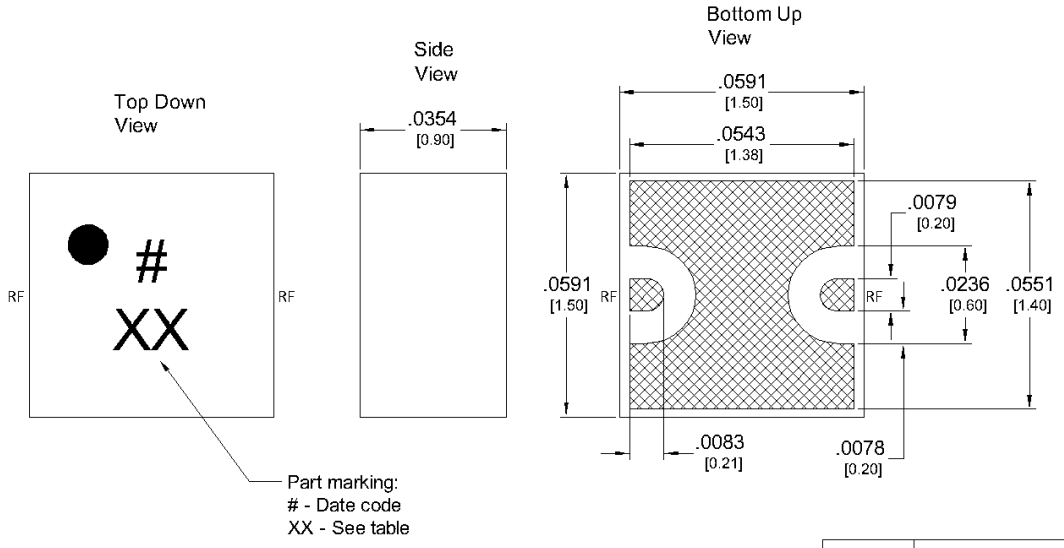
*All measurements are typical
units in inch +/-.004" [millimeter +/-0.1]

PROJECTION: INCH [MM]

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVALS
A	Initial Release	5/2/25	AT

DFN 1.5mm by 1.5mm date code

Code	Year	QTR
A	2021	Q1
B	2021	Q2
C	2021	Q3
D	2021	Q4
E	2022	Q1
F	2022	Q2
G	2022	Q3
H	2022	Q4
I	2023	Q1
J	2023	Q2
K	2023	Q3
L	2023	Q4
M	2024	Q1
N	2024	Q2
O	2024	Q3
P	2024	Q4
Q	2025	Q1
R	2025	Q2
S	2025	Q3
T	2025	Q4
U	2026	Q1
V	2026	Q2
W	2026	Q3
X	2026	Q4
Y	2027	Q1
Z	2027	Q2
0	2027	Q3
1	2027	Q4
2	2028	Q1
3	2028	Q2
4	2028	Q3
5	2028	Q4
6	2029	Q1
7	2029	Q2
8	2029	Q3
9	2029	Q4



XX	MEQ#-20CSP1
43	MEQ3-20CSP1
44	MEQ6-20CSP1
45	MEQ9-20CSP1
46	MEQ20-20CSP1

Notes: (Unless otherwise specified)

1. Shaded areas are metalized.
2. Finish: Ni: 0.5 - 2.5 µm
   Pd: 0.02 - 0.15 µm
   Au: 0.003 - 0.015 µm

MATERIAL:

FINISH:

DO NOT SCALE DRAWING

NOTES:

DRAWN BY	DATE
AVC	4/16/25
LCG	5/1/25
AR	5/1/25

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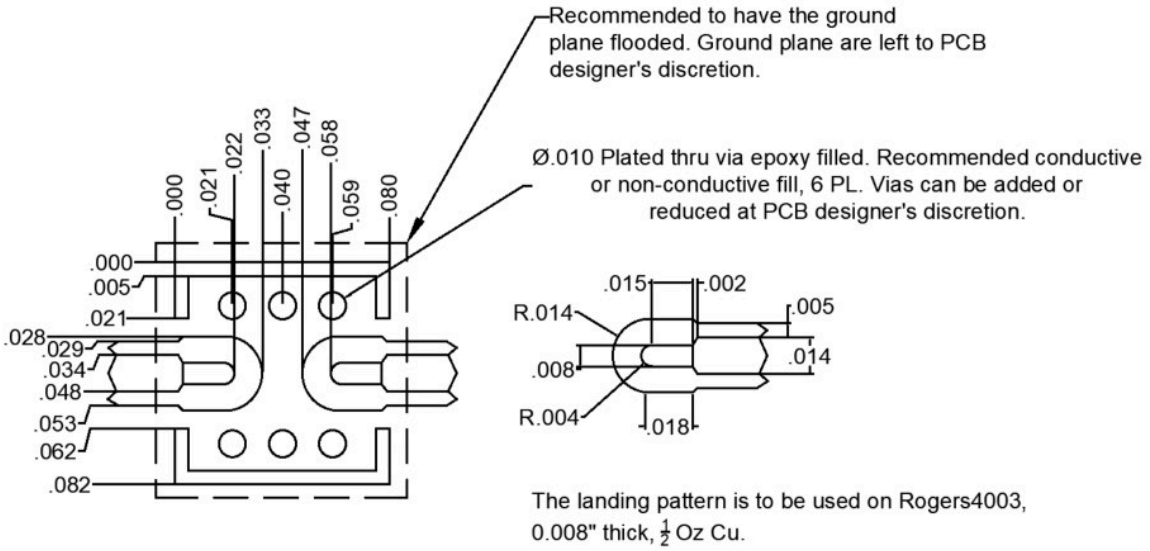
Outline
CSP1 Equalizer

SIZE	CAGE CODE	DWG. NO.
A	0UC32	MEQ#-20CSP1

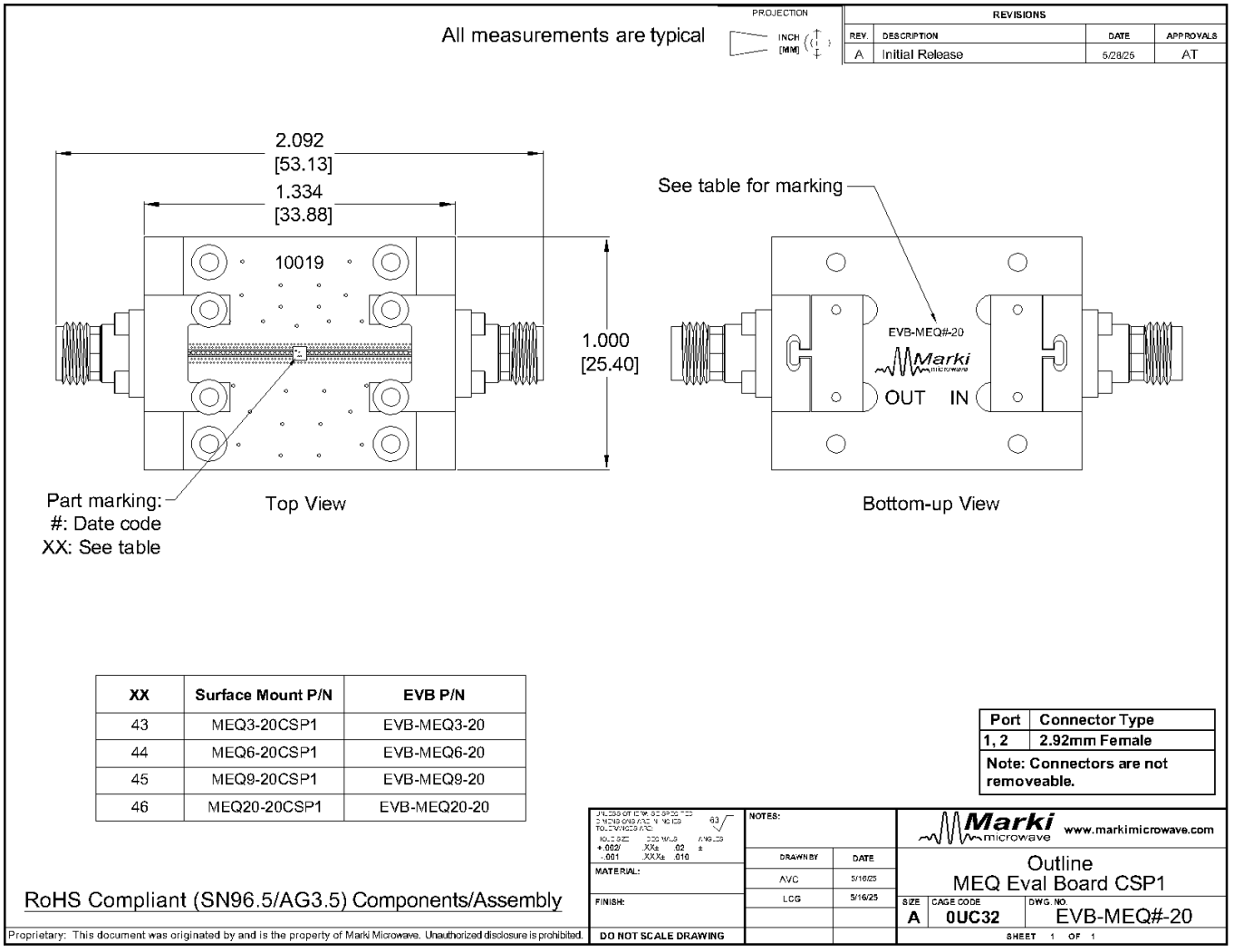
SHEET 1 OF 1

Footprint Image

Download : Footprint Drawing



Evaluation Board - Outline Drawing



XX	Surface Mount P/N	EVB P/N
43	MEQ3-20CSP1	EVB-MEQ3-20
44	MEQ6-20CSP1	EVB-MEQ6-20
45	MEQ9-20CSP1	EVB-MEQ9-20
46	MEQ20-20CSP1	EVB-MEQ20-20

Port	Connector Type
1, 2	2.92mm Female
Note: Connectors are not removeable.	

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