Ceramic

Low Pass Filter

LFCW-1062+

50Ω DC to 10.6 GHz

CASE STYLE: JC0603C-1

The Big Deal

- Small size 0603 (1.6 x 0.8 mm)
- Low insertion loss, 2.1 dB typical
- Rejection 20 dB typical from 12 to 15.21 GHz
- Good power handling, 4W

Product Overview

Mini-Circuits' LFCW-1062+ is a Low Temperature Co-fired Ceramic (LTCC) low pass filter, designed in a very small, 0603 package. The multilayer construction provides high repeatability of performance. Small, wrap-around terminations minimize variations in performance due to parasitics. Covering DC – 10.6 GHz, these units offer low insertion loss, good rejection, and excellent power handling capability.

Key Features

Feature	Advantages
Small size 0603 (1.6 x 0.8 mm)	Allows for high layout density of circuit boards while minimizing the effects of parasitics.
Stop band rejection 20 dB typical over 12 –15.21 GHz	Provides good rejection in a tiny package, saving PCB space for customers.
Wrap-around terminations	Provides excellent solderability and easy visual inspection.
LTCC construction	Rugged package, well-suited for tough environments including high humidity and high temperature extremes.

Notes
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B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. 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

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LFCW-1062+

50Ω DC[1] to 10.6 GHz

Generic photo used for illustration purposes only

CASE STYLE: JC0603C-1

+RoHS Compliant

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

Features

- Good power handling, 4W
- Small size 0603 (1.6 x 0.8 mm)
- 7 sections
- Temperature stable
- LTCC construction

Applications

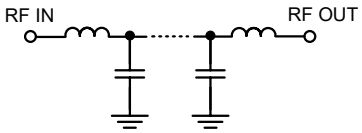
- Harmonic Rejection
- VHF/UHF transmitters / receivers
- lab use

Electrical Specifications[1,2] at 25°C

Parameter		F#	Frequency (GHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	DC - F1	DC - 10.6			2.8	dB
	Freq. cut-off	F2	10.8	—	3.0	—	dB
	VSWR	DC - F1	DC - 10.6	—	2.2	—	:1
Stop Band	Rejection	F3	12	—	20	—	dB
	Loss	F4 - F5	12.16 - 12.86	25	31	—	:1
		F6	15.21	—	20	—	dB

1 In Application where DC voltage is present at either input or output port, coupling capacitors are required.
2 Measured on Mini-Circuits Characterization Test Board TB-720+

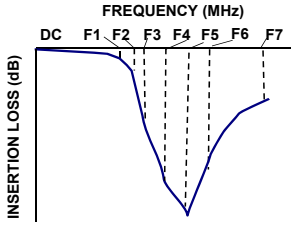
Functional Schematic



Maximum Ratings	
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power Input[3]	4W at 25°C

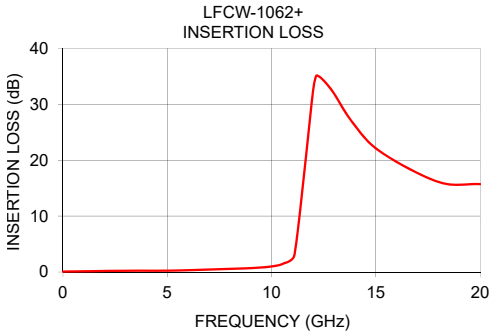
*Passband rating, derate linearly to 1.6W at 100°C ambient (Reference AN-75-005)
Permanent damage may occur if any of these limits are exceeded.

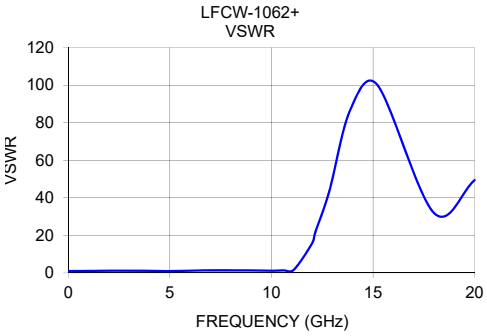
Typical Frequency Response



Typical Performance Data at 25°C

Frequency (GHz)	Insertion Loss (dB)	VSWR (:1)
0.01	0.07	1.00
0.50	0.10	1.03
1.00	0.13	1.07
3.00	0.23	1.21
5.00	0.24	1.01
7.00	0.44	1.38
9.00	0.69	1.34
10.00	1.00	1.18
10.60	1.56	1.38
11.10	3.10	1.69
12.00	32.69	15.76
12.16	35.14	21.74
12.86	32.64	44.06
13.86	26.86	86.35
15.21	21.54	100.15
18.00	16.11	31.94
20.00	15.72	49.40





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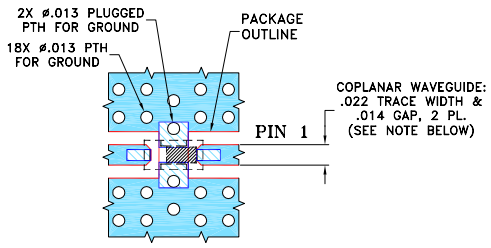
Pad Connections

INPUT	1
OUTPUT	3
GROUND	2,4

Product Marking: N/A

Evaluation Board MCL P/N: TB-720+
Suggested PCB Layout (PL-412)



NOTES:

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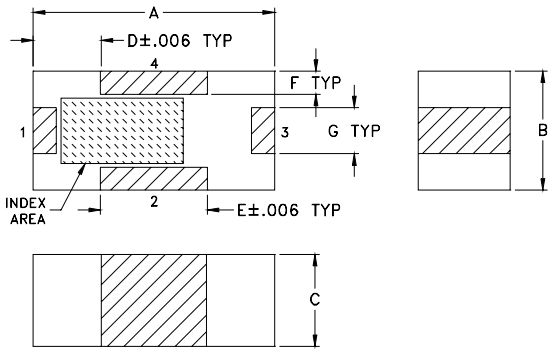
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	wt
.063	.031	.024	.018	.028	.006	.012	grams
1.60	0.79	0.61	0.46	0.71	0.15	0.30	0.005

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Ceramic Low Pass Filter LFCW-1062+

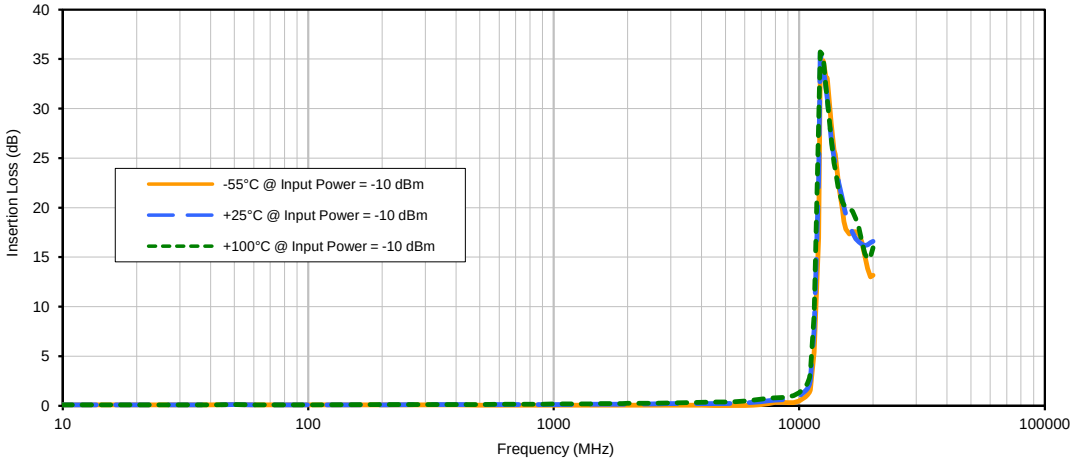
Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@ -55°C	@+25°C	@+100°C	@ -55°C	@+25°C	@+100°C	@ -55°C	@+25°C	@+100°C
10.0	0.08	0.09	0.08	37.38	37.90	44.86	35.37	35.59	36.46
20.0	0.08	0.08	0.09	44.74	56.84	45.42	44.95	55.82	44.32
30.0	0.08	0.08	0.09	42.09	56.44	41.87	42.75	51.44	40.35
40.0	0.08	0.08	0.09	40.94	54.10	39.89	42.71	50.41	38.17
50.0	0.12	0.13	0.13	46.68	49.68	37.60	40.55	55.75	39.39
60.0	0.08	0.08	0.09	39.41	54.47	41.17	42.22	50.12	37.73
70.0	0.08	0.09	0.10	40.92	48.94	39.56	42.89	48.17	37.95
80.0	0.09	0.09	0.10	41.94	48.46	40.70	45.68	47.92	38.38
90.0	0.08	0.09	0.10	43.94	49.48	42.37	49.56	47.98	39.39
100.0	0.08	0.09	0.10	44.55	48.60	46.51	51.79	48.06	41.31
100.0	0.08	0.09	0.10	44.55	48.60	46.51	51.79	48.06	41.31
200.0	0.08	0.10	0.11	39.43	44.58	33.41	37.57	44.63	34.18
300.0	0.08	0.11	0.12	39.44	40.68	38.52	48.20	40.58	36.15
400.0	0.08	0.11	0.13	44.99	38.84	33.96	41.68	37.86	33.26
500.0	0.07	0.11	0.14	39.38	36.76	30.42	42.41	35.66	30.69
600.0	0.07	0.12	0.15	35.71	34.61	29.70	35.17	34.04	29.24
700.0	0.07	0.12	0.15	33.08	33.44	28.49	32.30	32.45	28.05
800.0	0.07	0.12	0.16	32.20	31.97	27.36	31.75	31.28	27.23
900.0	0.07	0.13	0.17	30.01	31.11	26.62	29.67	30.17	26.20
1000.0	0.07	0.13	0.17	29.82	30.20	26.06	29.04	29.43	25.83
1100.0	0.07	0.13	0.18	30.18	29.51	25.63	28.97	28.63	25.32
1200.0	0.06	0.14	0.19	29.76	28.63	25.09	28.42	27.80	24.79
1300.0	0.06	0.14	0.19	29.65	27.98	24.75	28.60	27.21	24.44
1400.0	0.06	0.14	0.20	28.92	27.46	24.62	27.81	26.59	24.21
1500.0	0.06	0.15	0.21	28.59	26.87	24.42	27.32	26.10	24.00
1600.0	0.06	0.15	0.21	28.14	26.26	24.24	26.90	25.49	23.75
1700.0	0.06	0.16	0.22	27.60	25.80	24.30	26.54	25.10	23.80
1800.0	0.06	0.16	0.23	27.20	25.47	24.37	26.16	24.66	23.73
1900.0	0.06	0.16	0.23	27.20	25.07	24.45	26.01	24.36	23.88
2000.0	0.06	0.17	0.24	27.06	24.63	24.45	25.88	23.86	23.74
2500.0	0.06	0.19	0.26	24.49	23.25	25.16	23.92	22.58	24.13
3000.0	0.07	0.20	0.29	21.56	22.97	26.26	21.34	22.35	24.85
3500.0	0.06	0.21	0.31	21.63	23.40	26.98	21.67	22.87	25.42
4000.0	0.06	0.22	0.34	21.72	24.73	28.20	21.90	24.30	26.62
4500.0	0.04	0.22	0.37	25.72	28.38	30.73	25.93	28.08	29.86
5000.0	0.03	0.23	0.39	38.85	36.07	35.10	36.97	39.77	39.83
5500.0	0.03	0.25	0.42	30.26	29.87	31.33	29.86	30.34	33.11
6000.0	0.04	0.29	0.48	27.83	23.17	23.68	27.84	22.99	23.34
6500.0	0.06	0.35	0.56	22.14	19.06	18.90	22.58	18.88	18.35
7000.0	0.11	0.43	0.67	18.43	16.39	16.27	18.69	16.20	15.84
7500.0	0.21	0.52	0.75	14.67	14.77	15.55	14.87	14.73	15.24
8000.0	0.34	0.59	0.80	12.50	14.14	16.07	12.66	14.18	15.93
8500.0	0.35	0.62	0.84	12.84	14.71	17.63	13.22	14.93	17.79
9000.0	0.32	0.64	0.91	15.52	17.52	20.36	16.09	18.13	21.43
9500.0	0.32	0.69	1.03	24.67	25.12	24.92	27.00	31.54	28.96
10000.0	0.48	0.96	1.30	21.00	17.86	21.53	21.28	18.05	21.65
10600.0	0.91	1.53	1.94	14.01	13.07	14.25	14.31	12.88	14.10
10800.0	1.08	1.73	2.24	15.44	14.82	16.10	15.24	14.13	14.92
11000.0	1.36	2.11	2.77	19.04	21.43	21.79	17.07	17.05	16.27
11100.0	1.58	2.53	3.30	23.84	18.02	17.34	17.80	14.86	13.95
11500.0	5.42	7.68	9.23	4.76	3.70	3.78	4.65	3.70	3.71
12000.0	16.92	22.84	28.52	1.13	1.46	1.53	4.22	3.34	2.68
12160.0	33.32	35.67	35.73	0.39	0.91	1.17	1.25	1.43	1.56
12500.0	34.84	34.17	35.38	0.02	0.60	0.87	0.22	0.71	1.03
12860.0	33.17	32.10	32.07	0.15	0.40	0.75	0.02	0.51	0.87
13000.0	33.06	31.00	30.94	0.20	0.38	0.72	0.03	0.48	0.82
13500.0	28.60	27.05	26.99	0.31	0.26	0.69	0.13	0.35	0.75
13860.0	25.82	25.05	24.52	0.31	0.25	0.67	0.13	0.32	0.67
14000.0	25.37	24.51	23.86	0.32	0.21	0.67	0.15	0.27	0.64
14500.0	22.18	22.48	21.64	0.34	0.19	0.67	0.18	0.21	0.54
15000.0	19.68	20.79	20.52	0.37	0.18	0.65	0.25	0.17	0.45
15210.0	18.61	20.10	20.27	0.32	0.18	0.63	0.25	0.14	0.42
15500.0	17.84	19.30	20.08	0.32	0.19	0.63	0.26	0.16	0.37
16000.0	17.33	18.33	19.97	0.34	0.22	0.59	0.29	0.16	0.37
16500.0	17.56	17.47	19.62	0.37	0.29	0.60	0.32	0.19	0.40
17000.0	17.57	16.86	18.89	0.32	0.33	0.71	0.36	0.21	0.49
17500.0	17.34	16.52	17.91	0.30	0.44	0.89	0.33	0.22	0.56
18000.0	16.54	16.32	16.60	0.19	0.52	1.18	0.31	0.22	0.76
18500.0	15.19	16.19	15.41	0.06	0.62	1.49	0.22	0.28	0.92
19000.0	13.86	16.24	14.77	0.23	0.62	1.82	0.14	0.28	1.09
19500.0	13.00	16.47	15.06	0.27	0.65	1.84	0.03	0.30	1.06
20000.0	13.16	16.59	15.95	0.13	0.60	1.49	0.03	0.27	0.93

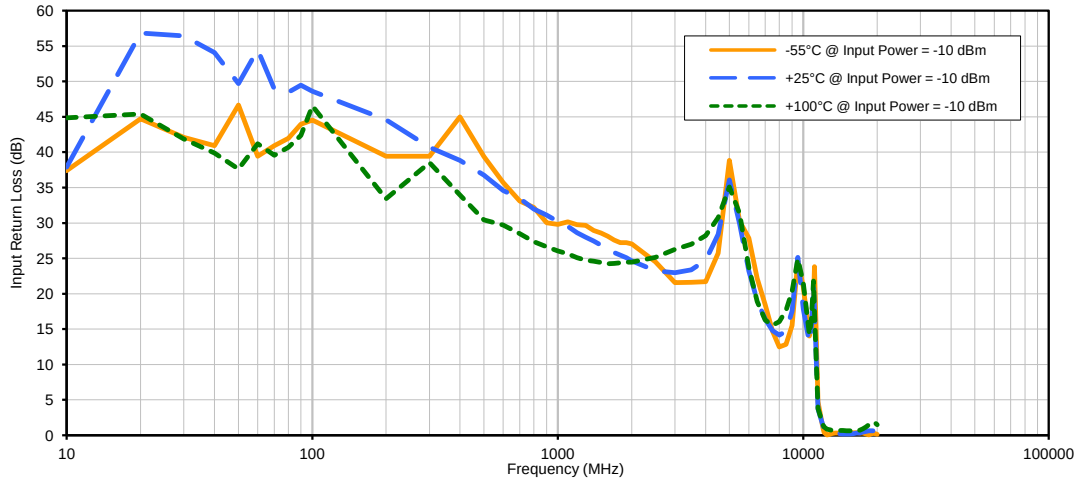
Ceramic Low Pass Filter LFCW-1062+

Typical Performance Data

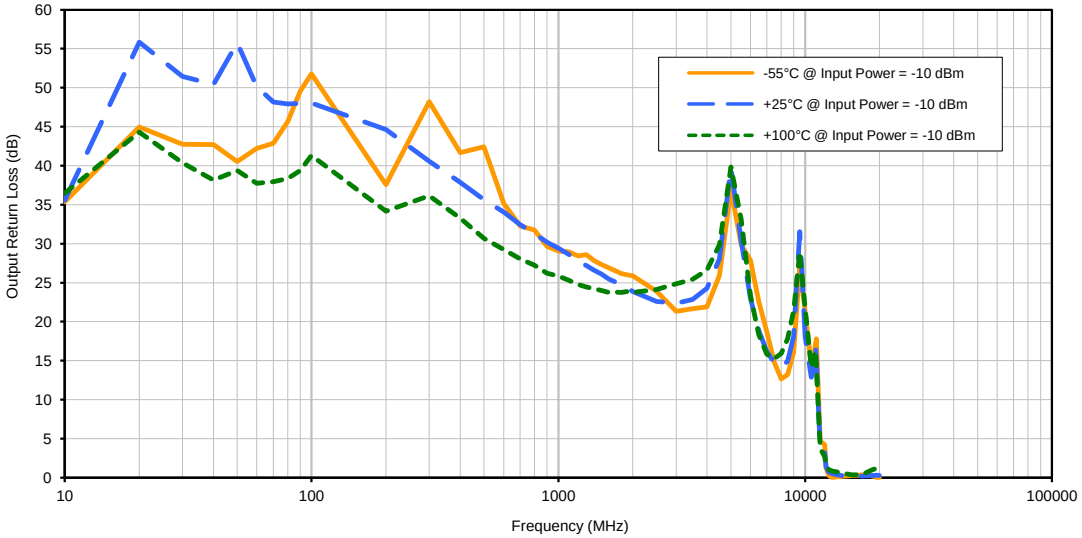
INSERTION LOSS vs. TEMPERATURE



INPUT RETURN LOSS vs. TEMPERATURE



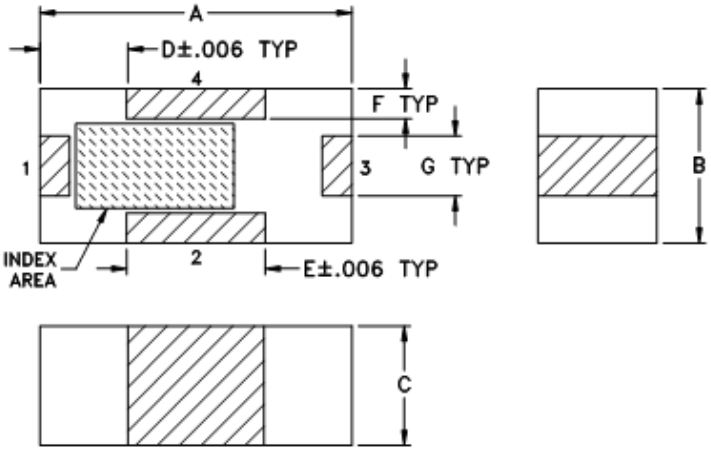
OUTPUT RETURN LOSS vs. TEMPERATURE



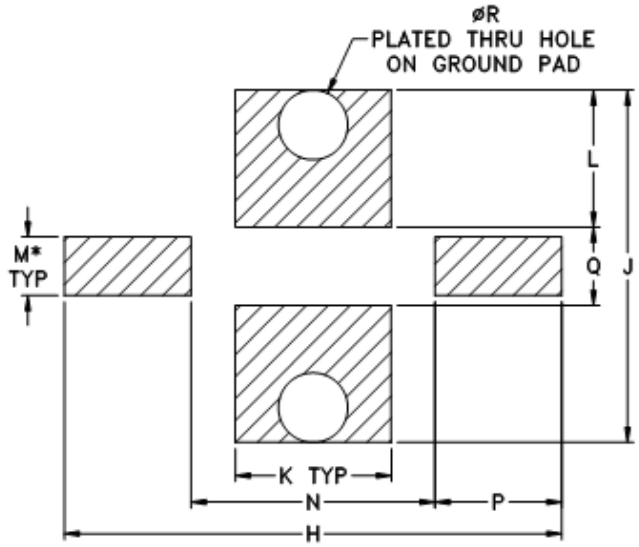
Case Style JC

Outline Dimensions

JC0603C-1



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L
JC0603C-1	.063 (1.60)	.031 (0.80)	.024 (0.60)	.018 (0.45)	.028 (0.70)	.006 (0.15)	.012 (0.30)	.100 (2.54)	.071 (1.80)	.032 (0.80)	.028 (0.70)

CASE #	M*	N	P	Q	R	WT. GRAMS
JC0603C-1	.012 (0.30)	.049 (1.24)	.026 (0.65)	.016 (0.40)	.014 (0.35)	.005

Dimensions are in inches (mm). Tolerances: 3 Pl. ± .004

Notes:

1. Open style, ceramic base.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
3. * - Line width should be designed to match 50 OHMS characteristic impedance, depending on PCB material & thickness.

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Tape & Reel Packaging TR-F114

DEVICE ORIENTATION IN T&R

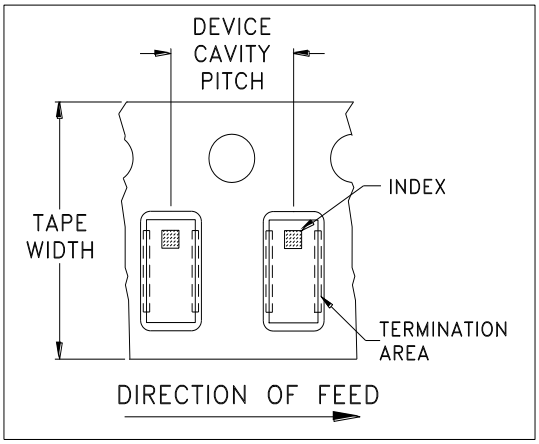

ILLUSTRATION 1

Applicable Case Styles	
GE0805C	JC0603C
GE0805C-1	JC0603C-4
GE0805C-1AP	JC0603C-6
GE0805C-7	
GE0805C-9	
GE0805C-10	
GE0805C-11	
GE0805C-12	

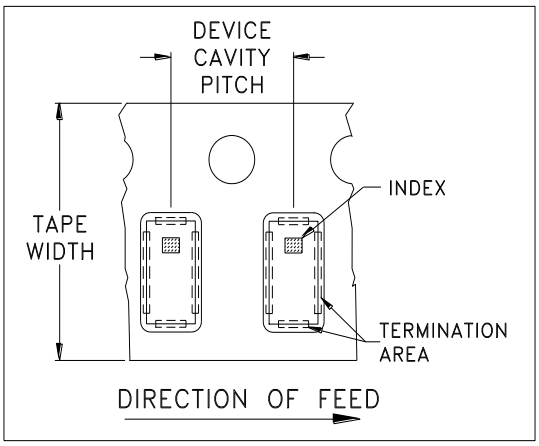

ILLUSTRATION 2

Applicable Case Styles	
GE0805C-2	JC0603C-1
GE0805C-3	JC0603C-2
GE0805C-4	JC0603C-3
GE0805C-5	JC0603C-5
GE0805C-6	JC0603C-7
GE0805C-8	
GE0805C-15	

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
			Standard	4000

Note: Please Consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

Mini-Circuits®
INTERNET http://www.minicircuits.com
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Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

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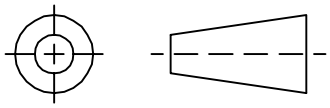
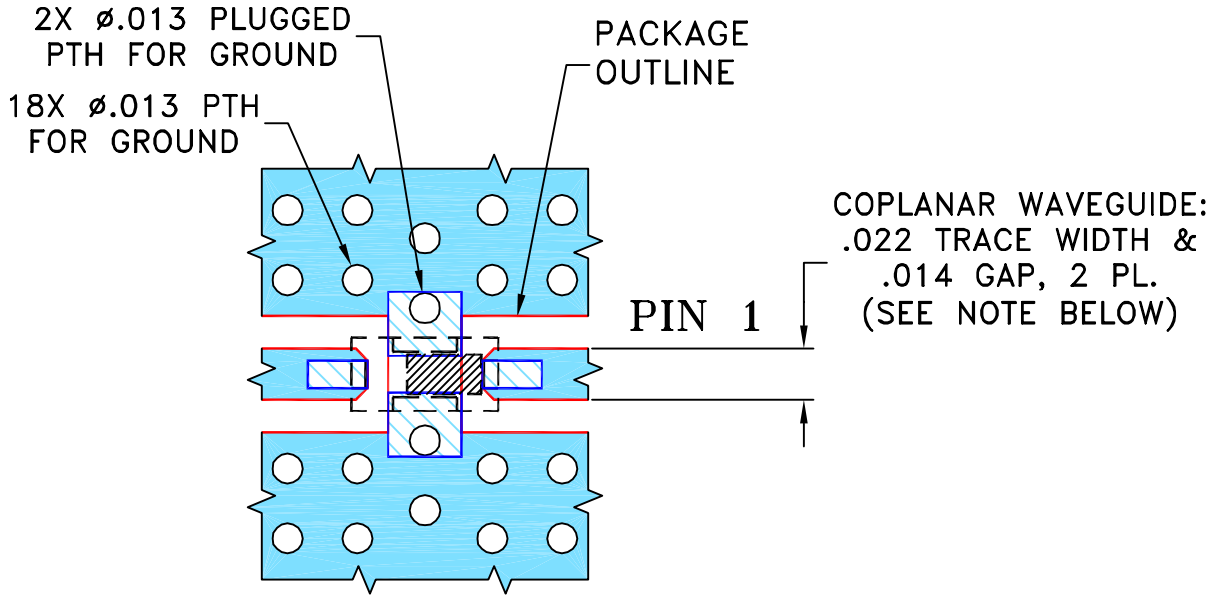
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M144975	NEW RELEASE	02/04/14	AV	RS

SUGGESTED MOUNTING CONFIGURATION FOR JC0603C-1 CASE STYLE, "04FL01" PIN CODE



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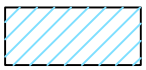
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	AV	01/24/14
TOLERANCES ON:	CHECKED	IL	02/03/14
2 PL DECIMALS ±	APPROVED	RS	02/04/14
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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ASHEETA1.DWG REV:A DATE:01/12/95

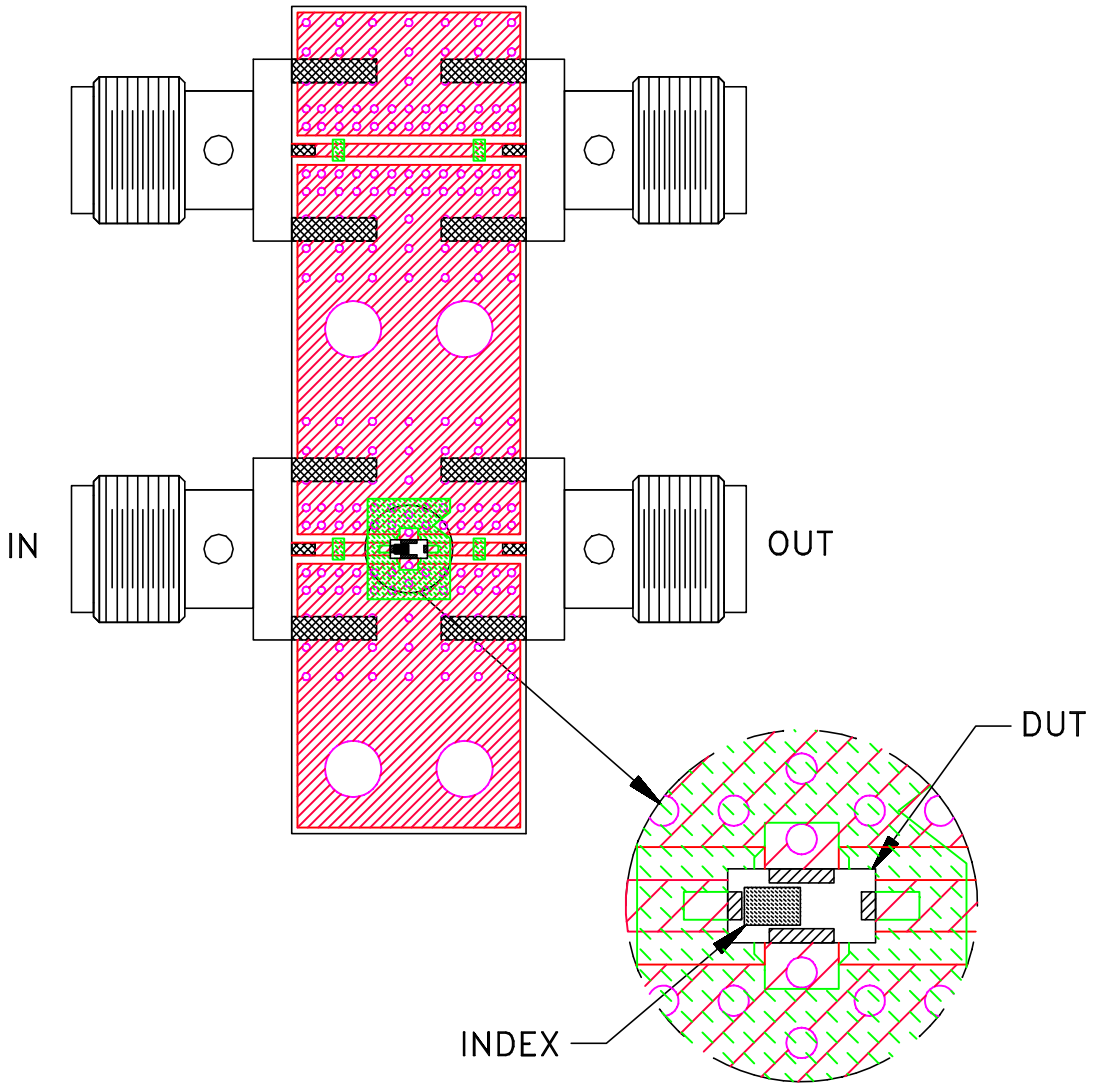
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 04FL01, JC0603C-1, TB-720+

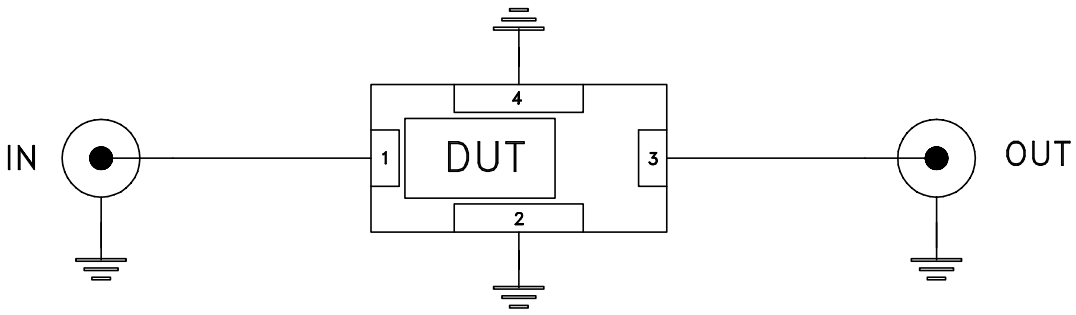
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-412	OR

FILE:	SCALE:	SHEET:
98PL412	12:1	1 OF 1

Evaluation Board and Circuit



TB-720+



Schematic Diagram

Notes:

1. 50 Ohm 2.92 mm End Launch Female connectors.
2. PCB Material: RO4350 or equivalent,
   Dielectric Constant=3.5, Thickness=.010 inch.

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Environmental Specifications ENV06

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
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
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

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