MMIC SURFACE MOUNT

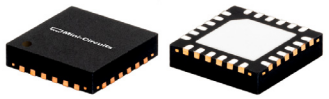
X3 Frequency Multiplier

CY3-453+

50Ω Output 20 to 45 GHz

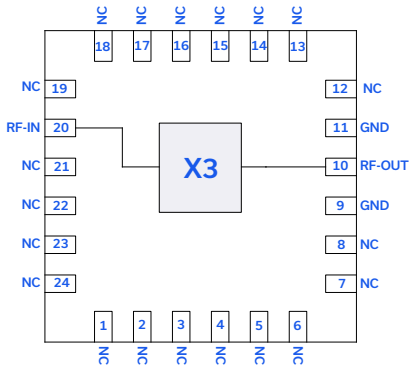
THE BIG DEAL

- Wideband Output From: 20 to 45 GHz
- Outstanding Fundamental and Close-in Harmonic Suppression:
  - F1: 39 dBc Typ.
  - F2: 46 dBc Typ.
  - F4: 40 dBc Typ.
- Input Drive Level: +12 to +17 dBm
- Conversion Loss: 20 dB Typ.
- Tiny Size, 4x4mm 24-Lead, QFN-Style



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM



APPLICATIONS

- 5G MIMO and Back Haul Radio Systems
- Satellite Communications
- Test and Measurement Equipment
- Radar, EW, and ECM Defense Systems

PRODUCT OVERVIEW

Mini-Circuits' CY3-453+ is a wideband MMIC Frequency Tripler, converting input frequencies from 6.66 to 15 GHz into output frequencies from 20 to 45 GHz. Its wide output range makes this model suitable for broadband systems as well as a wide variety of narrow-band applications. Utilizing GaAs HBT technology, the CY3-453+ comes housed in a 4x4mm 24-Lead QFN-Style package and offers excellent repeatability, low inductance, and good thermal efficiency.

KEY FEATURES

Features	Advantages
Broadband, 20 to 45 GHz output	With an output frequency range spanning 20 to 45 GHz, this multiplier supports broadband applications.
Excellent Fundamental and Harmonic Suppression • F1, 39 dBc Typ. • F2, 46 dBc Typ. • F4, 40 dBc Typ.	Harmonic and fundamental filtering requirements are dramatically simplified due to the high suppression resulting from internal cancellation within the diode configuration.
Wide input power range +12 to +17 dBm	Wide input power signal range accommodates different input signal levels while still maintain a low conversion loss.

X3 Frequency Multiplier

CY3-453+

50Ω Output 20 to 45 GHz

ELECTRICAL SPECIFICATIONS[1,3] AT +25°C AND Zo = 50Ω, UNLESS NOTED OTHERWISE

Parameter		Input Frequency (GHz)	Min.	Typ.	Max.	Unit
Multiplication Factor				3		
Frequency Range, Input (F1)			6.66		15	GHz
Frequency Range, Output (F3)			20		45	GHz
Input Power			+12	+16	+17	dBm
Conversion Loss (F3)		6.66-8		20.1	22.0	dB
		8-10		19.8	21.6	
		10-12		19.4	21.4	
		12-15		21.0	23.7	
Harmonic Output[2,3]	F1	6.66-8		40		dBc
		8-10		43		
		10-12		45		
		12-15		27		
	F2	6.66-8		58		dBc
		8-10		42		
		10-12		49		
		12-15		38		
	F4	6.66-8		30		dBc
		8-10		47		
		10-12		41		
		12-15		43		

1. Measured on Mini-Circuits Characterization Test Board TB-CY3-453C+.
2. Harmonics of input frequency below power of F3.
3. All specifications are measured with RF input power = +16 dBm.

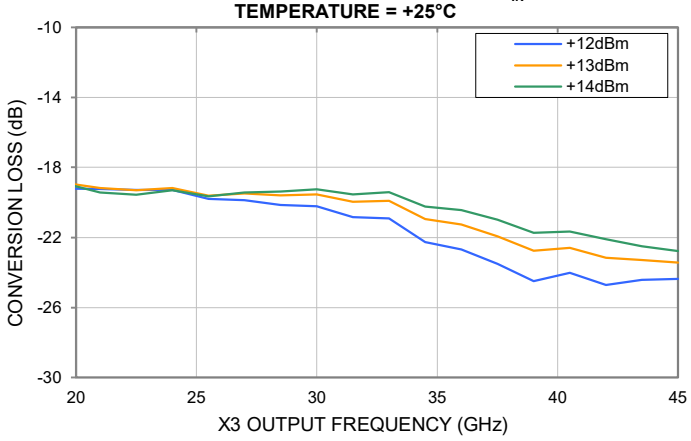
X3 Frequency Multiplier

CY3-453+

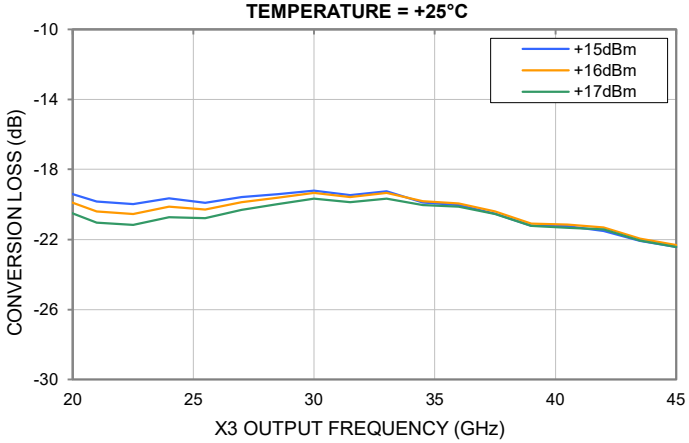
50Ω Output 20 to 45 GHz

TYPICAL PERFORMANCE GRAPHS

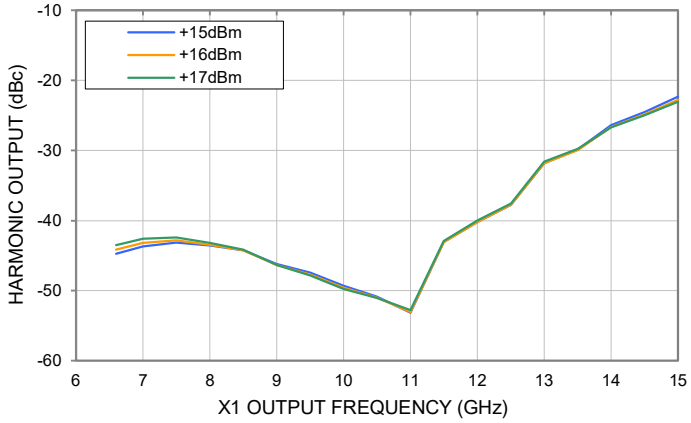
CONVERSION LOSS X3 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



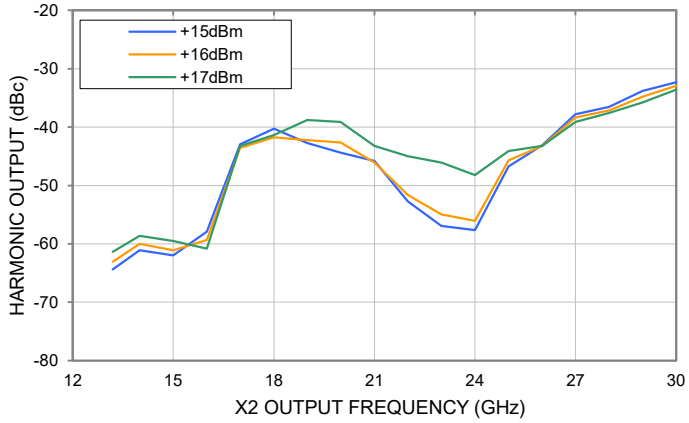
CONVERSION LOSS X3 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



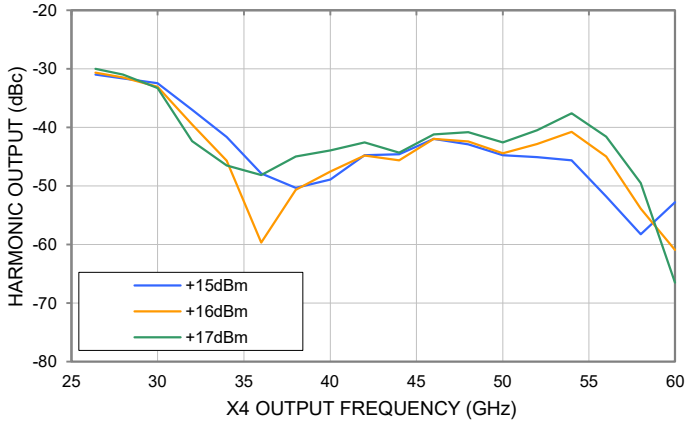
HARMONIC X1 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



HARMONIC X2 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



HARMONIC X4 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



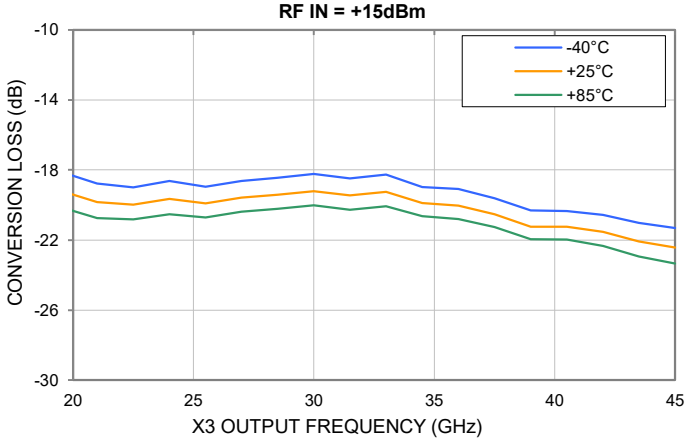
X3 Frequency Multiplier

CY3-453+

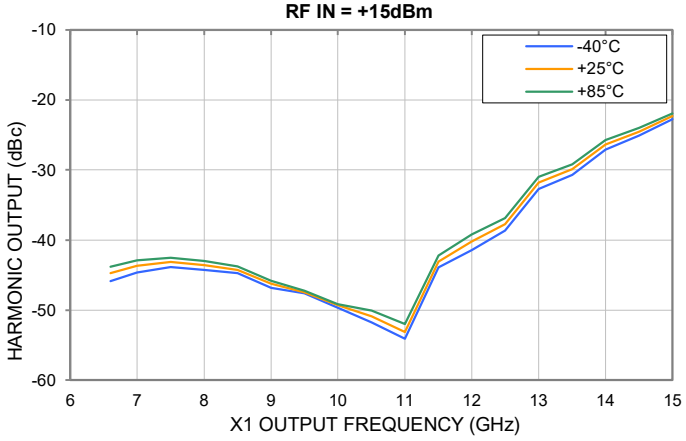
50Ω Output 20 to 45 GHz

TYPICAL PERFORMANCE GRAPHS

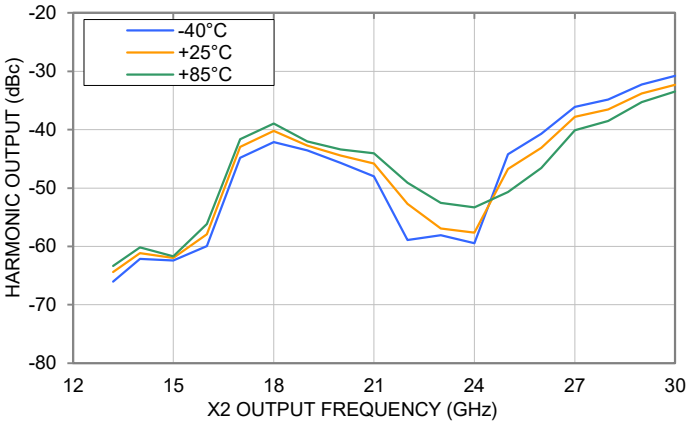
CONVERSION LOSS X3 OUTPUT vs. TEMPERATURE
RF IN = +15dBm



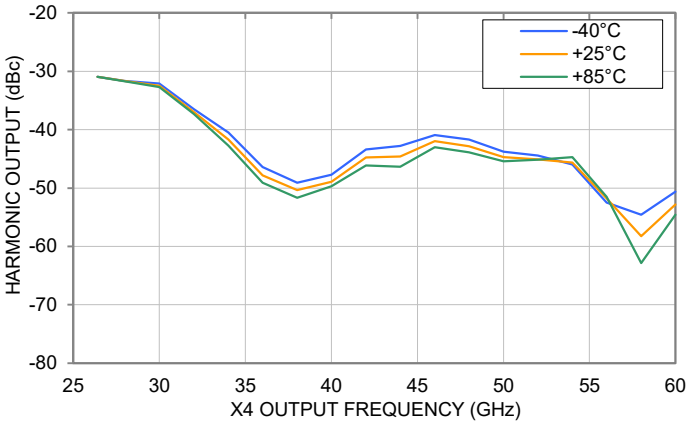
HARMONIC X1 OUTPUT vs. TEMPERATURE
RF IN = +15dBm



HARMONIC X2 OUTPUT vs. TEMPERATURE
RF IN = +15dBm



HARMONIC X4 OUTPUT vs. TEMPERATURE
RF IN = +15dBm



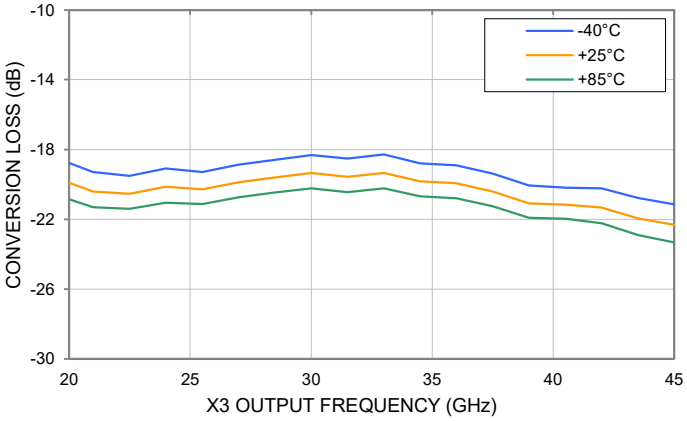
X3 Frequency Multiplier

CY3-453+

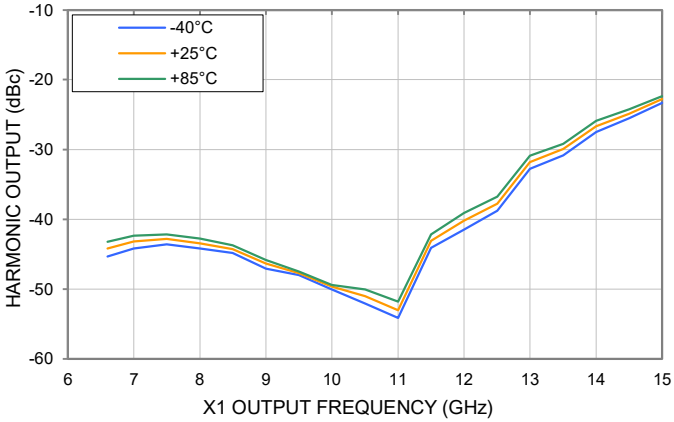
50Ω Output 20 to 45 GHz

TYPICAL PERFORMANCE GRAPHS

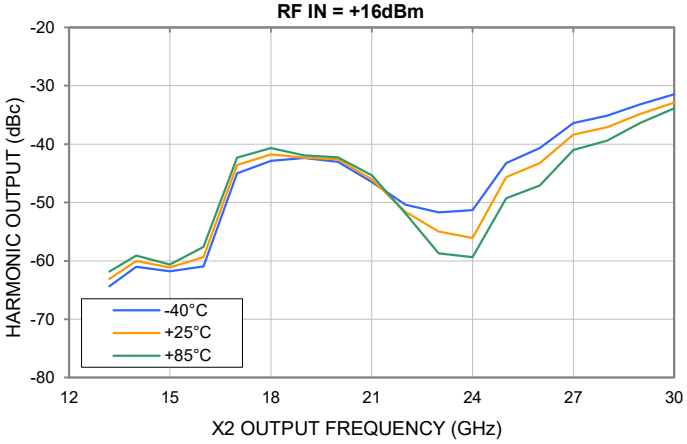
CONVERSION LOSS X3 OUTPUT vs. TEMPERATURE
RF IN = +16dBm



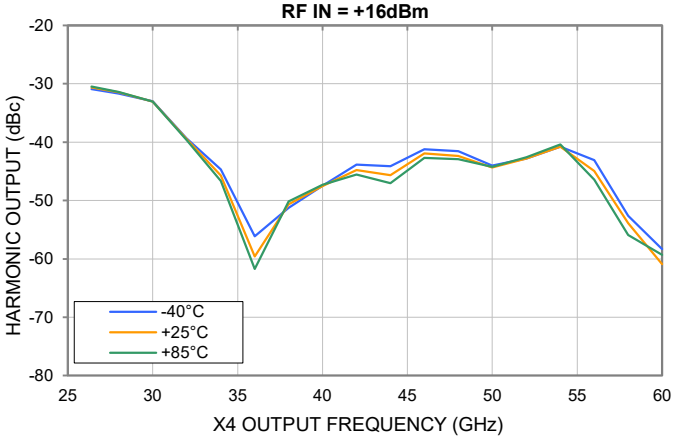
HARMONIC X1 OUTPUT vs. TEMPERATURE
RF IN = +16dBm



HARMONIC X2 OUTPUT vs. TEMPERATURE
RF IN = +16dBm



HARMONIC X4 OUTPUT vs. TEMPERATURE
RF IN = +16dBm

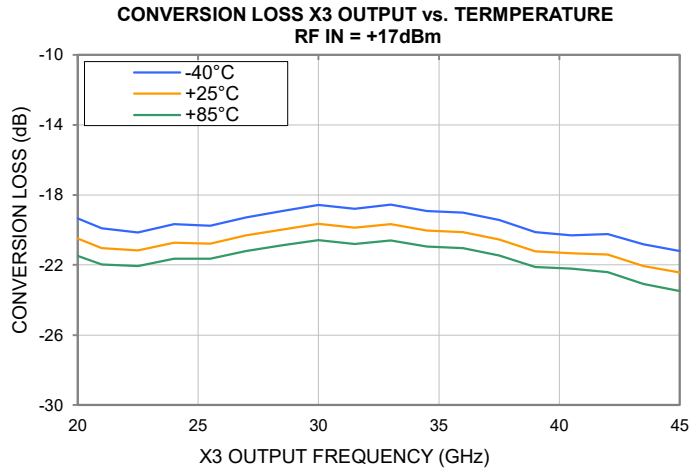


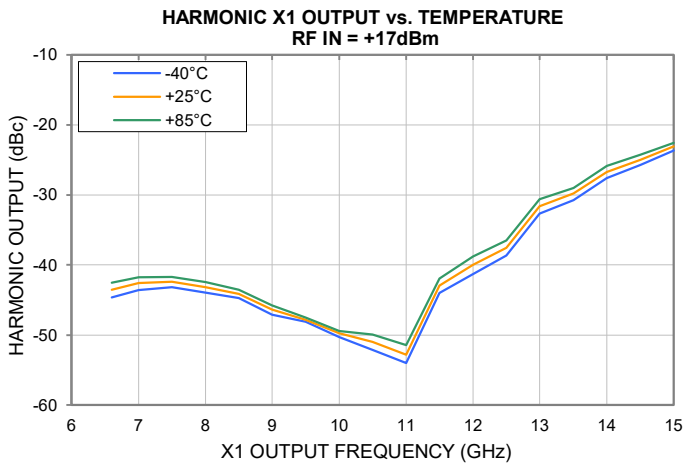
X3 Frequency Multiplier

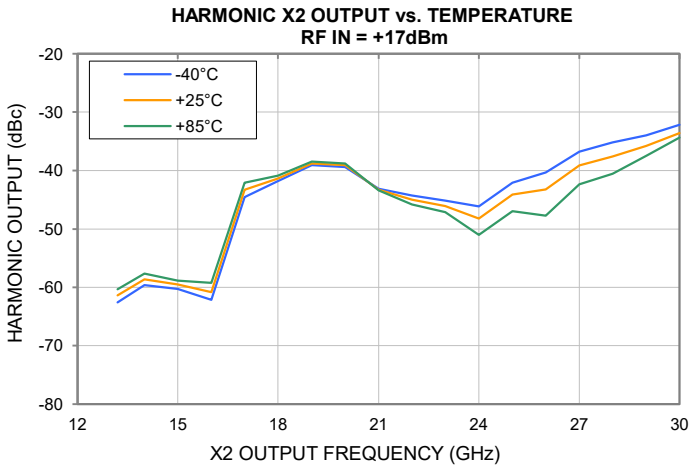
CY3-453+

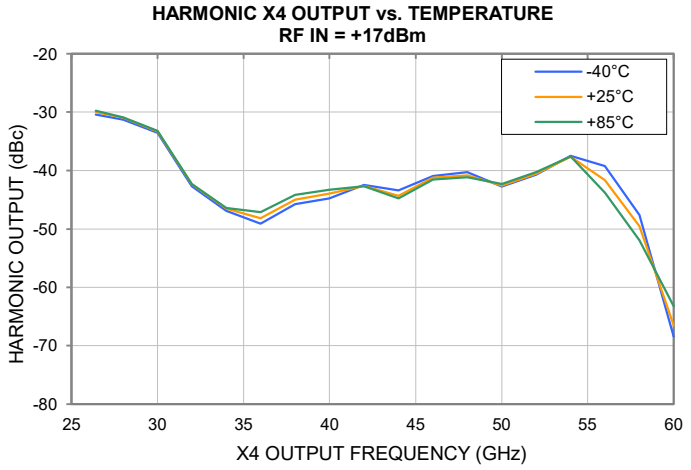
50Ω Output 20 to 45 GHz

TYPICAL PERFORMANCE GRAPHS









X3 Frequency Multiplier

CY3-453+

50Ω Output 20 to 45 GHz

ABSOLUTE MAXIMUM RATINGS[5]

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to +85°C
Storage Temperature	-65°C to +150°C
RF Input Power	+26 dBm (5 minute max) +23 dBm (Continuous)

5. Permanent damage may occur if any of these limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.

ESD RATING

	Class	Voltage Range	Reference Standard
HBM	1B	500V to < 1000V	ANSI/ESDA/JEDEC JS-001-2017
CDM	C2	500V to < 1000V	JESD22-C101F

ESD HANDLING PRECAUTION: This device is designed to be Class 1B for HBM. Static charges may easily produce potentials higher than this with improper handling and can discharge into DUT and damage it. As a preventive measure Industry standard ESD handling precautions should be used at all times to protect the device from ESD damage.

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020E/JEDEC J-STD-033C

X3 Frequency Multiplier

CY3-453+

50Ω Output 20 to 45 GHz

FUNCTIONAL DIAGRAM

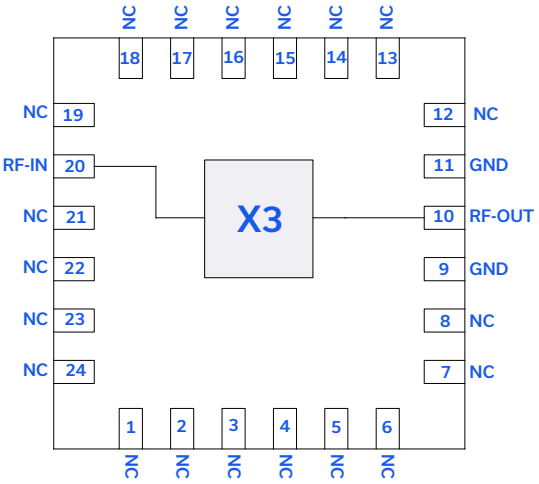


Figure 1. CY3-453+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description (Refer to Fig 1)
RF-IN	20	RF-IN Pad connects to RF Input Port
RF-OUT	10	RF-OUT Pad connects to RF Output Port
GND	9, 11, & Paddle	Connects to ground
NC	1-8, 12-19, 21-24	Not used internally. Connected to ground on test board

APPLICATION AND CHARACTERIZATION SETUP

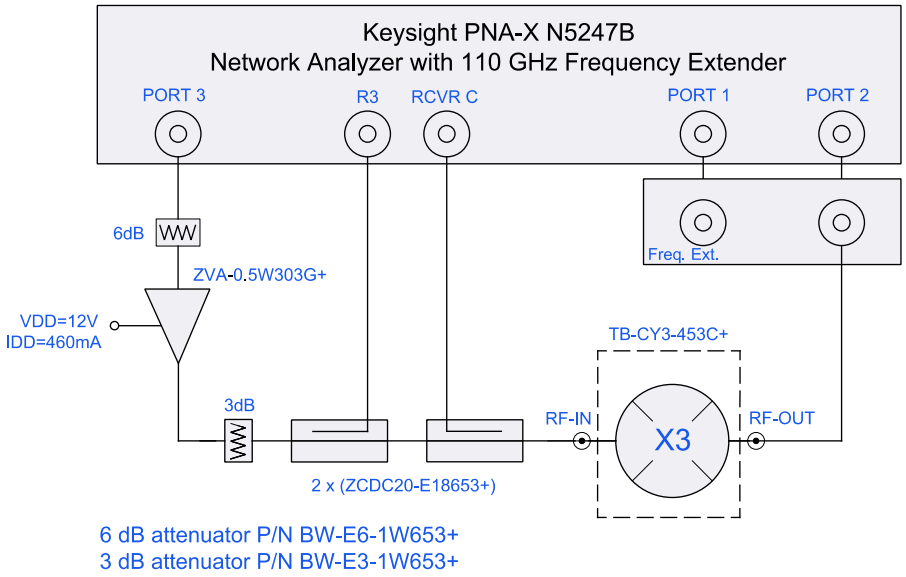


Figure 2. Application and Characterization Setup for CY3-453+

Conversion Loss and F1, F2, F4 Harmonic Rejection are measured using N5245A PNA-X microwave network analyzer.

Condition:
1. Conversion Loss and Harmonic Rejection: P_{IN}= +16 dBm

X3 Frequency Multiplier

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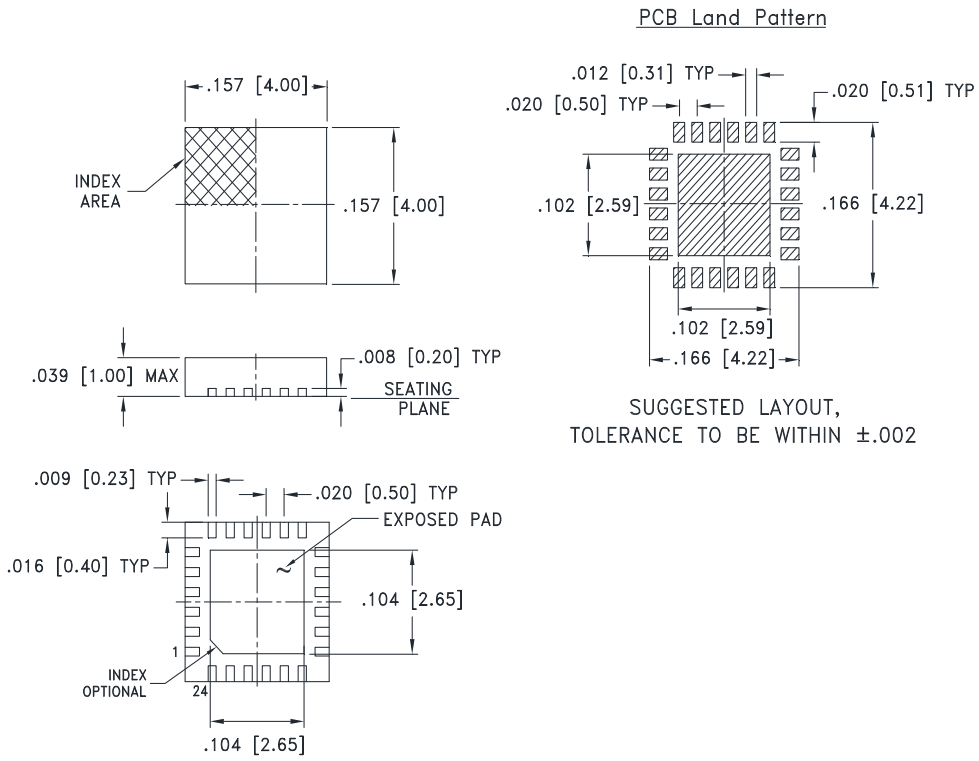
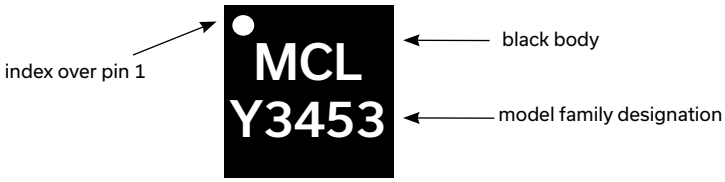
CASE STYLE DRAWING



Weight: .04 Grams
Dimensions are in inches [mm]. Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

X3 Frequency Multiplier

CY3-453+

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ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD CLICK HERE

Performance Data	Data Table Swept Graphs
Case Style	DG1847. Plastic package, exposed paddle, Lead Finish: Matte-Tin
RoHs Status	Compliant
Tape & Reel **Standard quantities available on reel**	F68 7" reels with 20, 50, 100, 200, 500, 1K or 2K devices
Suggested Layout for PCB Design	PL-732
Evaluation Board	TB-CY3-453C+
Environmental Ratings	ENV08T1

NOTES

A. 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.
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/terms/viewterm.html

Typical Performance Data

TEST CONDITION: RF IN = +15dBm

Frequency (GHz)				Temperature = -40°C			
				Conversion Loss	Harmonic Output*		
X1 Output	X2 Output	X3 Output	X4 Output	X3 Output	X1 Output	X2 Output	X4 Output
6.6	13.2	19.8	26.4	18.24	45.85	66.03	30.95
7.0	14.0	21.0	28.0	18.76	44.62	62.13	31.63
7.5	15.0	22.5	30.0	18.99	43.85	62.41	32.10
8.0	16.0	24.0	32.0	18.63	44.27	59.94	36.47
8.5	17.0	25.5	34.0	18.94	44.74	44.79	40.48
9.0	18.0	27.0	36.0	18.62	46.83	42.10	46.42
9.5	19.0	28.5	38.0	18.43	47.61	43.52	49.08
10.0	20.0	30.0	40.0	18.23	49.63	45.71	47.72
10.5	21.0	31.5	42.0	18.48	51.75	47.99	43.37
11.0	22.0	33.0	44.0	18.26	54.08	58.86	42.78
11.5	23.0	34.5	46.0	18.97	43.90	58.09	40.94
12.0	24.0	36.0	48.0	19.08	41.41	59.44	41.67
12.5	25.0	37.5	50.0	19.62	38.65	44.25	43.77
13.0	26.0	39.0	52.0	20.31	32.70	40.70	44.43
13.5	27.0	40.5	54.0	20.35	30.69	36.09	45.93
14.0	28.0	42.0	56.0	20.55	27.09	34.85	52.46
14.5	29.0	43.5	58.0	21.01	25.07	32.26	54.59
15.0	30.0	45.0	60.0	21.31	22.77	30.77	50.65

* Harmonic Output below power level of X3 Output

Frequency (GHz)				Temperature = +25°C			
				Conversion Loss	Harmonic Output*		
X1 Output	X2 Output	X3 Output	X4 Output	X3 Output	X1 Output	X2 Output	X4 Output
6.6	13.2	19.8	26.4	19.33	44.74	64.38	30.96
7.0	14.0	21.0	28.0	19.84	43.67	61.13	31.65
7.5	15.0	22.5	30.0	19.99	43.13	61.99	32.46
8.0	16.0	24.0	32.0	19.66	43.57	57.89	36.98
8.5	17.0	25.5	34.0	19.90	44.24	42.97	41.66
9.0	18.0	27.0	36.0	19.58	46.22	40.25	47.85
9.5	19.0	28.5	38.0	19.40	47.45	42.75	50.34
10.0	20.0	30.0	40.0	19.21	49.29	44.40	48.91
10.5	21.0	31.5	42.0	19.45	50.89	45.81	44.76
11.0	22.0	33.0	44.0	19.24	53.13	52.73	44.59
11.5	23.0	34.5	46.0	19.89	43.07	56.93	41.96
12.0	24.0	36.0	48.0	20.03	40.22	57.63	42.85
12.5	25.0	37.5	50.0	20.52	37.76	46.75	44.74
13.0	26.0	39.0	52.0	21.23	31.78	43.09	45.08
13.5	27.0	40.5	54.0	21.24	29.88	37.84	45.65
14.0	28.0	42.0	56.0	21.52	26.38	36.55	51.77
14.5	29.0	43.5	58.0	22.08	24.50	33.78	58.27
15.0	30.0	45.0	60.0	22.42	22.30	32.29	52.79

* Harmonic Output below power level of X3 Output

Frequency (GHz)				Temperature = +85°C			
				Conversion Loss	Harmonic Output*		
X1 Output	X2 Output	X3 Output	X4 Output	X3 Output	X1 Output	X2 Output	X4 Output
6.6	13.2	19.8	26.4	20.25	43.79	63.35	30.94
7.0	14.0	21.0	28.0	20.73	42.88	60.18	31.68
7.5	15.0	22.5	30.0	20.83	42.51	61.71	32.69
8.0	16.0	24.0	32.0	20.53	42.97	56.18	37.32
8.5	17.0	25.5	34.0	20.71	43.74	41.59	42.73
9.0	18.0	27.0	36.0	20.38	45.79	38.95	49.13
9.5	19.0	28.5	38.0	20.21	47.27	41.99	51.67
10.0	20.0	30.0	40.0	20.01	49.13	43.40	49.68
10.5	21.0	31.5	42.0	20.26	50.03	44.03	46.16
11.0	22.0	33.0	44.0	20.06	51.97	49.11	46.33
11.5	23.0	34.5	46.0	20.64	42.20	52.52	43.01
12.0	24.0	36.0	48.0	20.80	39.21	53.31	43.89
12.5	25.0	37.5	50.0	21.27	36.83	50.69	45.39
13.0	26.0	39.0	52.0	21.95	30.96	46.54	45.13
13.5	27.0	40.5	54.0	21.97	29.21	40.08	44.71
14.0	28.0	42.0	56.0	22.33	25.71	38.48	51.48
14.5	29.0	43.5	58.0	22.95	24.00	35.29	62.86
15.0	30.0	45.0	60.0	23.35	21.95	33.44	54.59

* Harmonic Output below power level of X3 Output

Typical Performance Data

TEST CONDITION: RF IN = +16dBm

Frequency (GHz)				Temperature = -40°C			
				Conversion Loss	Harmonic Output*		
X1 Output	X2 Output	X3 Output	X4 Output	X3 Output	X1 Output	X2 Output	X4 Output
6.6	13.2	19.8	26.4	18.67	45.33	64.34	30.90
7.0	14.0	21.0	28.0	19.29	44.16	61.00	31.68
7.5	15.0	22.5	30.0	19.51	43.59	61.80	33.02
8.0	16.0	24.0	32.0	19.10	44.19	60.92	39.32
8.5	17.0	25.5	34.0	19.29	44.82	44.98	44.64
9.0	18.0	27.0	36.0	18.86	47.06	42.88	56.11
9.5	19.0	28.5	38.0	18.58	47.97	42.40	51.26
10.0	20.0	30.0	40.0	18.31	50.08	43.01	47.46
10.5	21.0	31.5	42.0	18.52	52.05	46.48	43.89
11.0	22.0	33.0	44.0	18.28	54.13	50.37	44.10
11.5	23.0	34.5	46.0	18.79	44.10	51.65	41.21
12.0	24.0	36.0	48.0	18.89	41.49	51.32	41.55
12.5	25.0	37.5	50.0	19.37	38.78	43.25	44.03
13.0	26.0	39.0	52.0	20.06	32.81	40.64	42.85
13.5	27.0	40.5	54.0	20.18	30.83	36.35	40.75
14.0	28.0	42.0	56.0	20.22	27.50	35.13	43.08
14.5	29.0	43.5	58.0	20.79	25.54	33.16	52.60
15.0	30.0	45.0	60.0	21.14	23.34	31.43	58.33

* Harmonic Output below power level of X3 Output

Frequency (GHz)				Temperature = +25°C			
				Conversion Loss	Harmonic Output*		
X1 Output	X2 Output	X3 Output	X4 Output	X3 Output	X1 Output	X2 Output	X4 Output
6.6	13.2	19.8	26.4	19.81	44.18	63.09	30.64
7.0	14.0	21.0	28.0	20.40	43.18	60.01	31.48
7.5	15.0	22.5	30.0	20.54	42.83	61.13	33.05
8.0	16.0	24.0	32.0	20.14	43.45	59.34	39.47
8.5	17.0	25.5	34.0	20.28	44.25	43.56	45.67
9.0	18.0	27.0	36.0	19.87	46.36	41.74	59.62
9.5	19.0	28.5	38.0	19.60	47.73	42.27	50.64
10.0	20.0	30.0	40.0	19.35	49.61	42.60	47.54
10.5	21.0	31.5	42.0	19.57	51.01	46.05	44.79
11.0	22.0	33.0	44.0	19.34	53.04	51.59	45.64
11.5	23.0	34.5	46.0	19.83	43.12	54.95	41.92
12.0	24.0	36.0	48.0	19.94	40.21	56.06	42.38
12.5	25.0	37.5	50.0	20.40	37.77	45.64	44.39
13.0	26.0	39.0	52.0	21.09	31.79	43.21	42.81
13.5	27.0	40.5	54.0	21.16	29.94	38.35	40.74
14.0	28.0	42.0	56.0	21.32	26.67	37.11	44.97
14.5	29.0	43.5	58.0	21.95	24.85	34.77	53.87
15.0	30.0	45.0	60.0	22.32	22.79	32.91	60.92

* Harmonic Output below power level of X3 Output

Frequency (GHz)				Temperature = +85°C			
				Conversion Loss	Harmonic Output*		
X1 Output	X2 Output	X3 Output	X4 Output	X3 Output	X1 Output	X2 Output	X4 Output
6.6	13.2	19.8	26.4	20.77	43.22	61.86	30.48
7.0	14.0	21.0	28.0	21.32	42.37	59.05	31.38
7.5	15.0	22.5	30.0	21.40	42.17	60.63	33.09
8.0	16.0	24.0	32.0	21.04	42.79	57.62	39.62
8.5	17.0	25.5	34.0	21.13	43.71	42.31	46.65
9.0	18.0	27.0	36.0	20.72	45.85	40.68	61.74
9.5	19.0	28.5	38.0	20.47	47.49	41.95	50.13
10.0	20.0	30.0	40.0	20.22	49.40	42.22	47.30
10.5	21.0	31.5	42.0	20.44	50.09	45.35	45.55
11.0	22.0	33.0	44.0	20.23	51.78	51.87	47.05
11.5	23.0	34.5	46.0	20.68	42.15	58.70	42.69
12.0	24.0	36.0	48.0	20.80	39.10	59.35	42.95
12.5	25.0	37.5	50.0	21.25	36.75	49.29	44.21
13.0	26.0	39.0	52.0	21.92	30.88	47.09	42.57
13.5	27.0	40.5	54.0	21.97	29.20	40.99	40.42
14.0	28.0	42.0	56.0	22.24	25.89	39.42	46.41
14.5	29.0	43.5	58.0	22.91	24.24	36.31	55.90
15.0	30.0	45.0	60.0	23.32	22.35	33.89	59.32

* Harmonic Output below power level of X3 Output

Typical Performance Data

TEST CONDITION: RF IN = +17dBm

Frequency (GHz)				Temperature = -40°C			
				Conversion Loss	Harmonic Output*		
X1 Output	X2 Output	X3 Output	X4 Output	X3 Output	X1 Output	X2 Output	X4 Output
6.6	13.2	19.8	26.4	19.22	44.64	62.56	30.38
7.0	14.0	21.0	28.0	19.91	43.56	59.62	31.29
7.5	15.0	22.5	30.0	20.14	43.17	60.29	33.52
8.0	16.0	24.0	32.0	19.67	43.95	62.12	42.67
8.5	17.0	25.5	34.0	19.76	44.73	44.56	46.90
9.0	18.0	27.0	36.0	19.27	47.09	41.77	49.08
9.5	19.0	28.5	38.0	18.92	48.12	39.06	45.78
10.0	20.0	30.0	40.0	18.58	50.32	39.42	44.72
10.5	21.0	31.5	42.0	18.78	52.12	43.12	42.47
11.0	22.0	33.0	44.0	18.56	53.98	44.27	43.40
11.5	23.0	34.5	46.0	18.92	44.00	45.14	40.92
12.0	24.0	36.0	48.0	19.01	41.32	46.11	40.26
12.5	25.0	37.5	50.0	19.43	38.65	42.04	42.70
13.0	26.0	39.0	52.0	20.12	32.65	40.30	40.69
13.5	27.0	40.5	54.0	20.30	30.72	36.73	37.47
14.0	28.0	42.0	56.0	20.23	27.61	35.14	39.18
14.5	29.0	43.5	58.0	20.83	25.74	33.98	47.60
15.0	30.0	45.0	60.0	21.20	23.66	32.14	68.46

* Harmonic Output below power level of X3 Output

Frequency (GHz)				Temperature = +25°C			
				Conversion Loss	Harmonic Output*		
X1 Output	X2 Output	X3 Output	X4 Output	X3 Output	X1 Output	X2 Output	X4 Output
6.6	13.2	19.8	26.4	20.39	43.51	61.36	29.98
7.0	14.0	21.0	28.0	21.04	42.59	58.66	30.98
7.5	15.0	22.5	30.0	21.17	42.40	59.51	33.29
8.0	16.0	24.0	32.0	20.72	43.17	60.80	42.34
8.5	17.0	25.5	34.0	20.78	44.12	43.25	46.51
9.0	18.0	27.0	36.0	20.31	46.35	41.37	48.15
9.5	19.0	28.5	38.0	19.98	47.82	38.78	44.99
10.0	20.0	30.0	40.0	19.67	49.78	39.08	43.95
10.5	21.0	31.5	42.0	19.87	51.02	43.27	42.59
11.0	22.0	33.0	44.0	19.66	52.79	44.99	44.32
11.5	23.0	34.5	46.0	20.03	42.93	46.05	41.20
12.0	24.0	36.0	48.0	20.11	39.97	48.21	40.79
12.5	25.0	37.5	50.0	20.54	37.56	44.09	42.55
13.0	26.0	39.0	52.0	21.22	31.58	43.19	40.52
13.5	27.0	40.5	54.0	21.33	29.79	39.08	37.61
14.0	28.0	42.0	56.0	21.41	26.70	37.57	41.61
14.5	29.0	43.5	58.0	22.06	24.97	35.75	49.53
15.0	30.0	45.0	60.0	22.43	23.05	33.57	66.51

* Harmonic Output below power level of X3 Output

Frequency (GHz)				Temperature = +85°C			
				Conversion Loss	Harmonic Output*		
X1 Output	X2 Output	X3 Output	X4 Output	X3 Output	X1 Output	X2 Output	X4 Output
6.6	13.2	19.8	26.4	21.38	42.53	60.32	29.76
7.0	14.0	21.0	28.0	21.98	41.73	57.68	30.87
7.5	15.0	22.5	30.0	22.05	41.71	58.85	33.20
8.0	16.0	24.0	32.0	21.64	42.46	59.22	42.28
8.5	17.0	25.5	34.0	21.65	43.50	42.09	46.42
9.0	18.0	27.0	36.0	21.20	45.76	40.88	47.10
9.5	19.0	28.5	38.0	20.88	47.52	38.46	44.15
10.0	20.0	30.0	40.0	20.59	49.46	38.78	43.28
10.5	21.0	31.5	42.0	20.80	49.95	43.42	42.65
11.0	22.0	33.0	44.0	20.59	51.43	45.81	44.77
11.5	23.0	34.5	46.0	20.95	41.90	47.11	41.52
12.0	24.0	36.0	48.0	21.04	38.80	50.99	41.15
12.5	25.0	37.5	50.0	21.46	36.48	46.94	42.32
13.0	26.0	39.0	52.0	22.12	30.62	47.69	40.22
13.5	27.0	40.5	54.0	22.21	29.00	42.36	37.60
14.0	28.0	42.0	56.0	22.40	25.84	40.54	43.75
14.5	29.0	43.5	58.0	23.08	24.29	37.50	51.93
15.0	30.0	45.0	60.0	23.48	22.55	34.32	63.24

* Harmonic Output below power level of X3 Output

Typical Performance Data

TEST CONDITION: RF IN = +12 to 14dBm

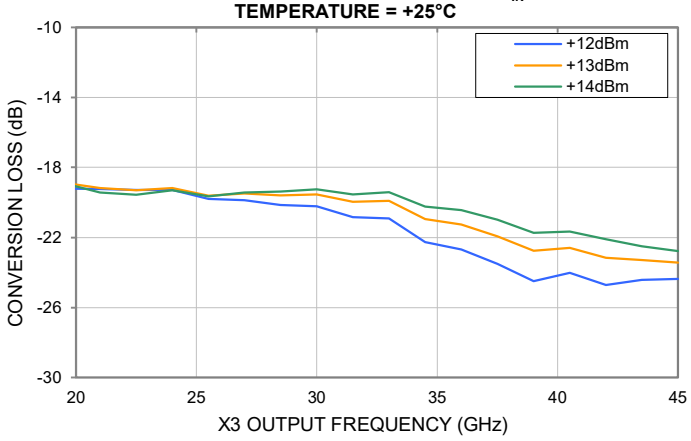
Frequency (GHz)				Temperature = +25°C Conversion Loss		
X1 Output	X2 Output	X3 Output	X4 Output	12dBm	13dBm	14dBm
6.6	13.2	19.8	26.4	19.21	18.93	19.01
7.0	14.0	21.0	28.0	19.22	19.18	19.42
7.5	15.0	22.5	30.0	19.27	19.29	19.55
8.0	16.0	24.0	32.0	19.27	19.17	19.32
8.5	17.0	25.5	34.0	19.80	19.60	19.65
9.0	18.0	27.0	36.0	19.86	19.50	19.43
9.5	19.0	28.5	38.0	20.15	19.59	19.37
10.0	20.0	30.0	40.0	20.22	19.53	19.24
10.5	21.0	31.5	42.0	20.84	19.96	19.54
11.0	22.0	33.0	44.0	20.90	19.90	19.41
11.5	23.0	34.5	46.0	22.28	20.96	20.23
12.0	24.0	36.0	48.0	22.68	21.24	20.44
12.5	25.0	37.5	50.0	23.51	21.94	20.98
13.0	26.0	39.0	52.0	24.49	22.77	21.73
13.5	27.0	40.5	54.0	24.02	22.59	21.67
14.0	28.0	42.0	56.0	24.72	23.16	22.10
14.5	29.0	43.5	58.0	24.43	23.29	22.50
15.0	30.0	45.0	60.0	24.36	23.43	22.78

* Harmonic Output below power level of X3 Output

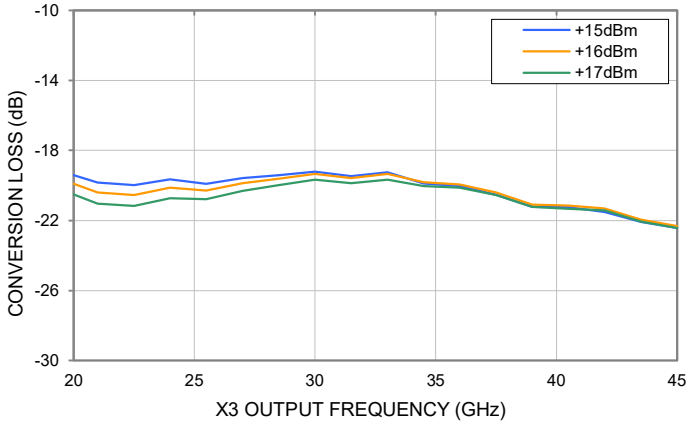
Typical Performance Curves

Note: Harmonics data is presented as the harmonic of input frequency below the power of F3

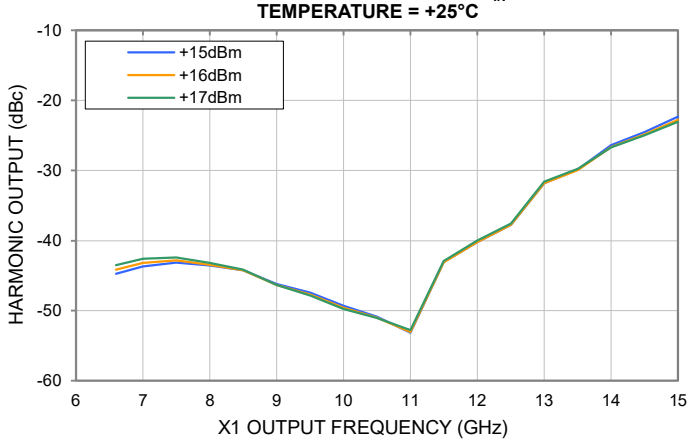
CONVERSION LOSS X3 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



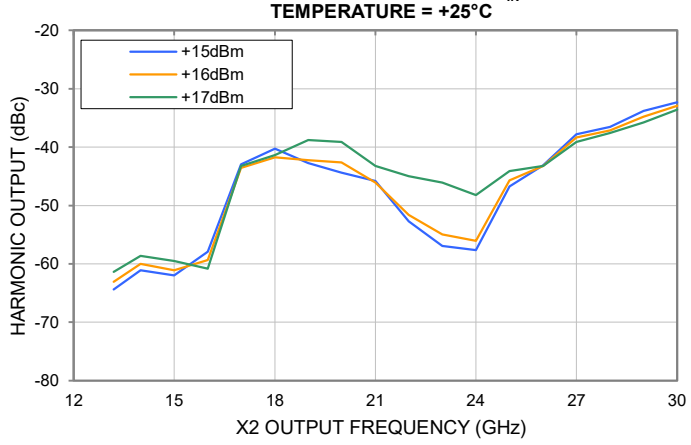
CONVERSION LOSS X3 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



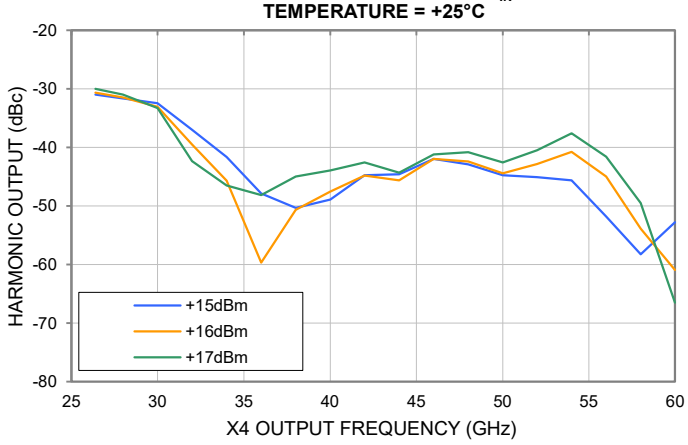
HARMONIC X1 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



HARMONIC X2 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



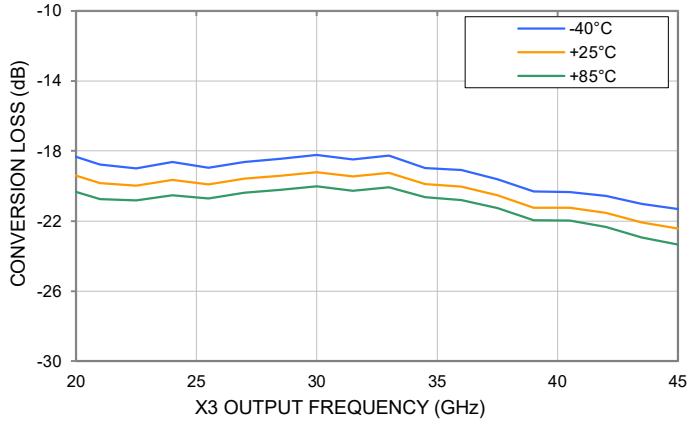
HARMONIC X4 OUTPUT vs. P_{IN}
TEMPERATURE = +25°C



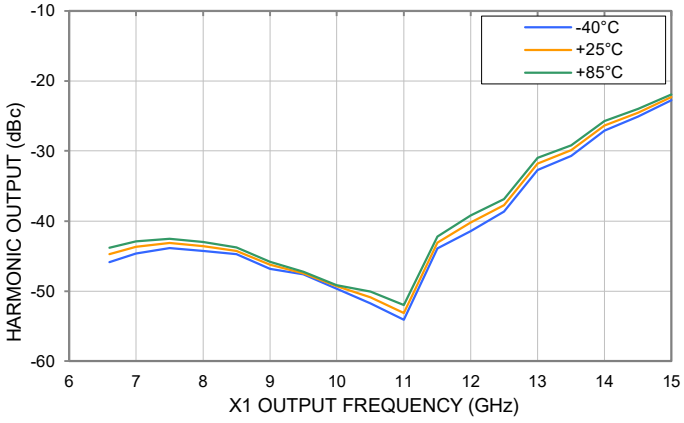
Typical Performance Curves

Note: Harmonics data is presented as the harmonic of input frequency below the power of F3

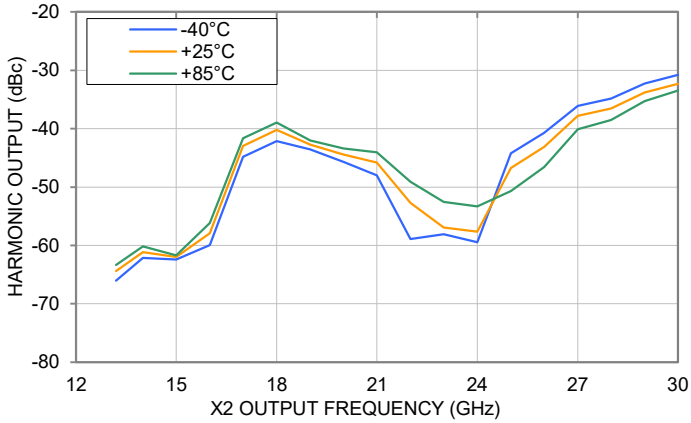
CONVERSION LOSS X3 OUTPUT vs. TEMPERATURE
RF IN = +15dBm



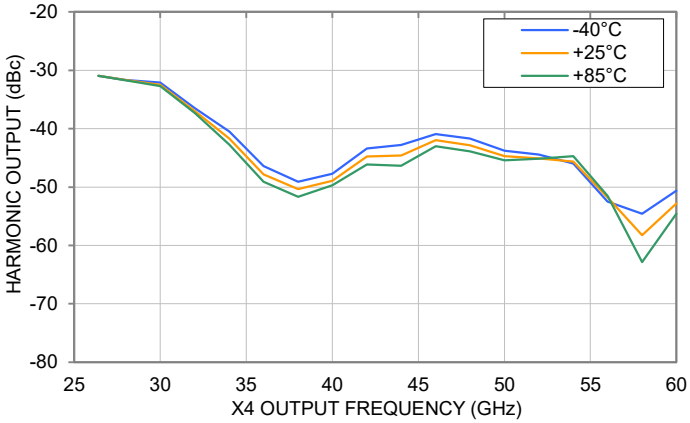
HARMONIC X1 OUTPUT vs. TEMPERATURE
RF IN = +15dBm



HARMONIC X2 OUTPUT vs. TEMPERATURE
RF IN = +15dBm



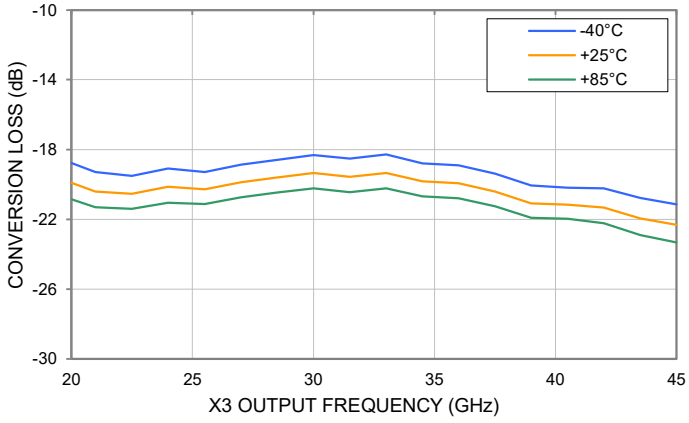
HARMONIC X4 OUTPUT vs. TEMPERATURE
RF IN = +15dBm



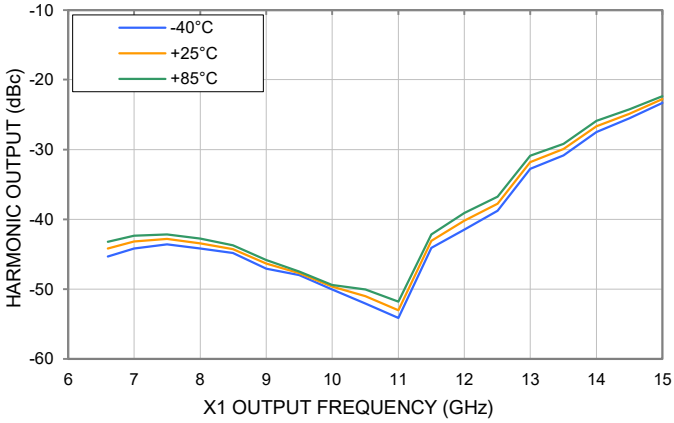
Typical Performance Curves

Note: Harmonics data is presented as the harmonic of input frequency below the power of F3

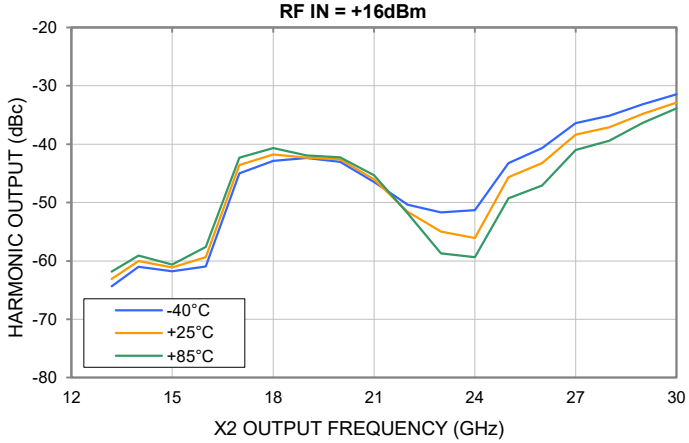
CONVERSION LOSS X3 OUTPUT vs. TEMPERATURE
RF IN = +16dBm



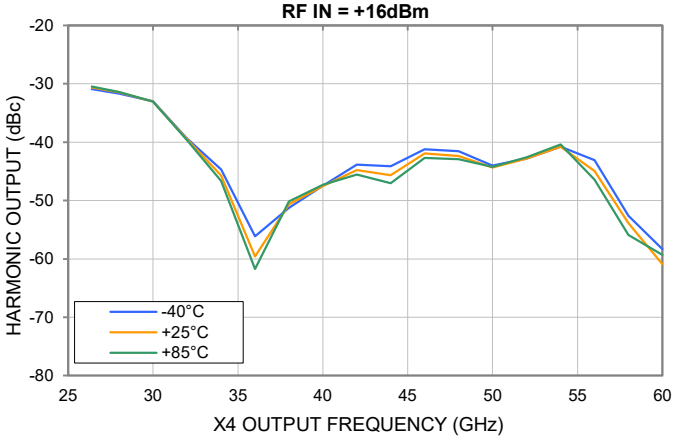
HARMONIC X1 OUTPUT vs. TEMPERATURE
RF IN = +16dBm



HARMONIC X2 OUTPUT vs. TEMPERATURE
RF IN = +16dBm



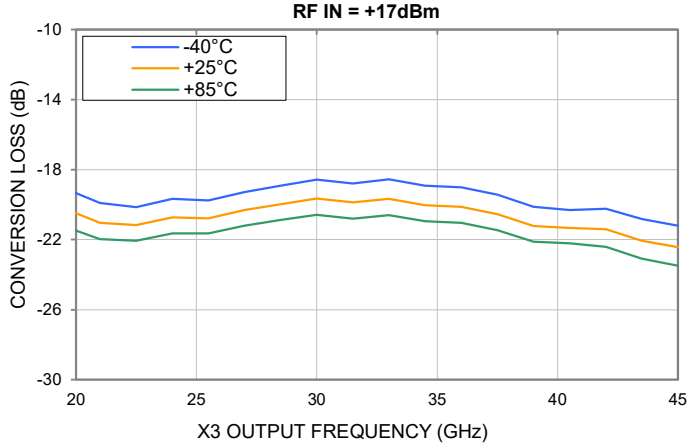
HARMONIC X4 OUTPUT vs. TEMPERATURE
RF IN = +16dBm



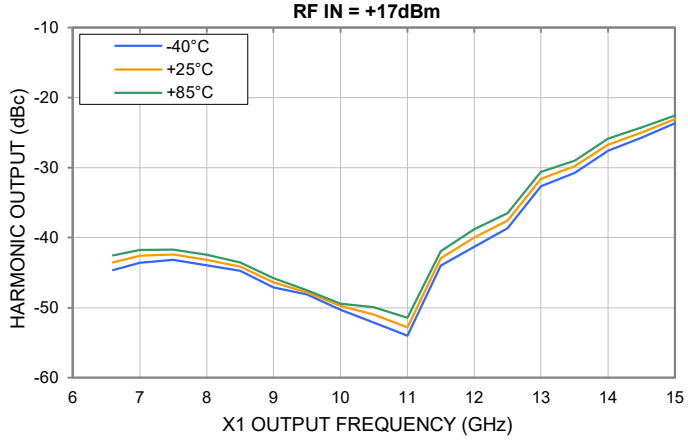
Typical Performance Curves

Note: Harmonics data is presented as the harmonic of input frequency below the power of F3

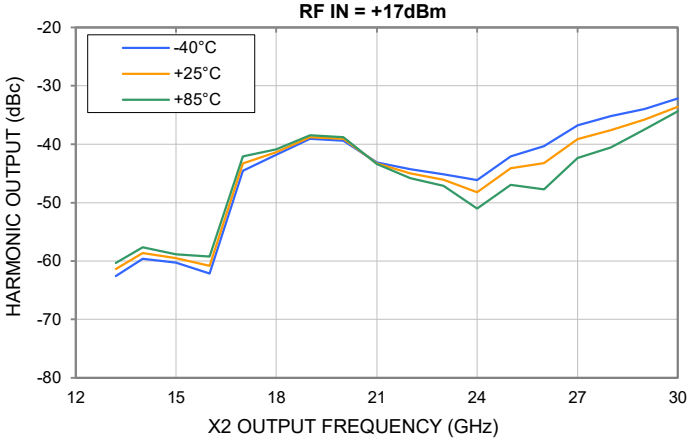
CONVERSION LOSS X3 OUTPUT vs. TERMPERATURE
RF IN = +17dBm



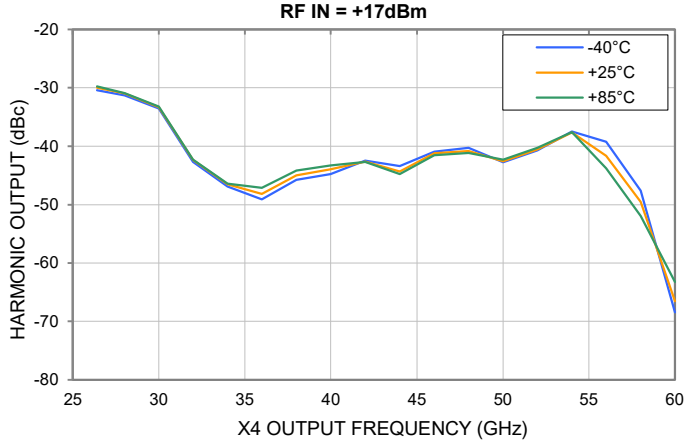
HARMONIC X1 OUTPUT vs. TEMPERATURE
RF IN = +17dBm



HARMONIC X2 OUTPUT vs. TEMPERATURE
RF IN = +17dBm



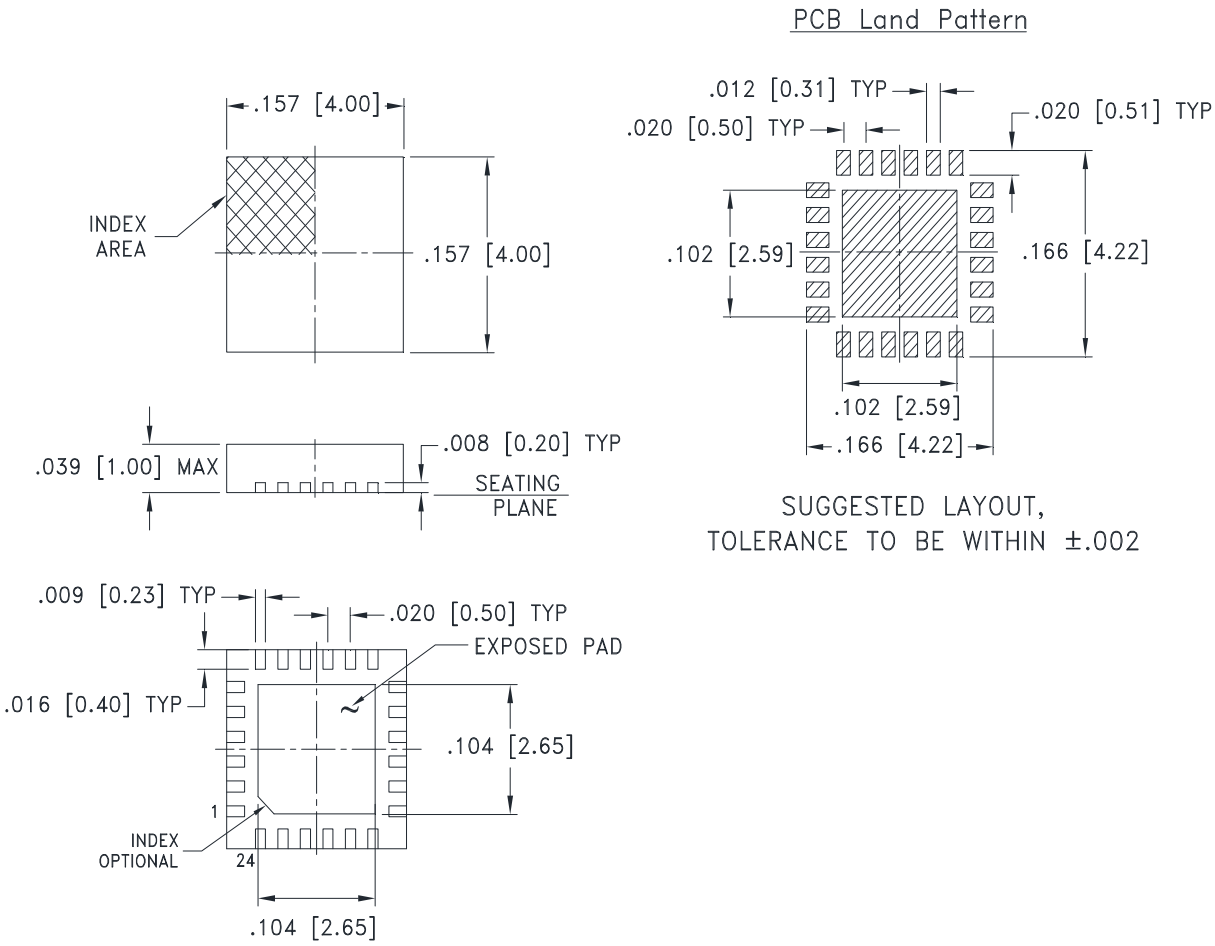
HARMONIC X4 OUTPUT vs. TEMPERATURE
RF IN = +17dBm



Case Style DG

DG1847

Outline Dimensions



Weight: .04 Grams

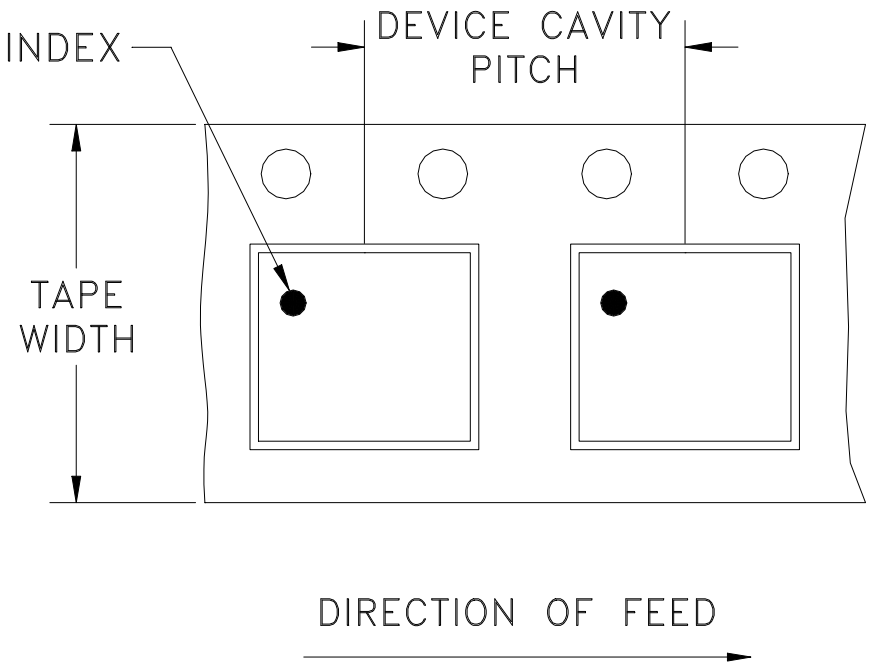
Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

Notes:

1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. All models, (+) suffix. See model Data sheet.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Tape & Reel Packaging TR-F68

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
12	8	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000
		13	Standard	2000
				3000
				4000

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.

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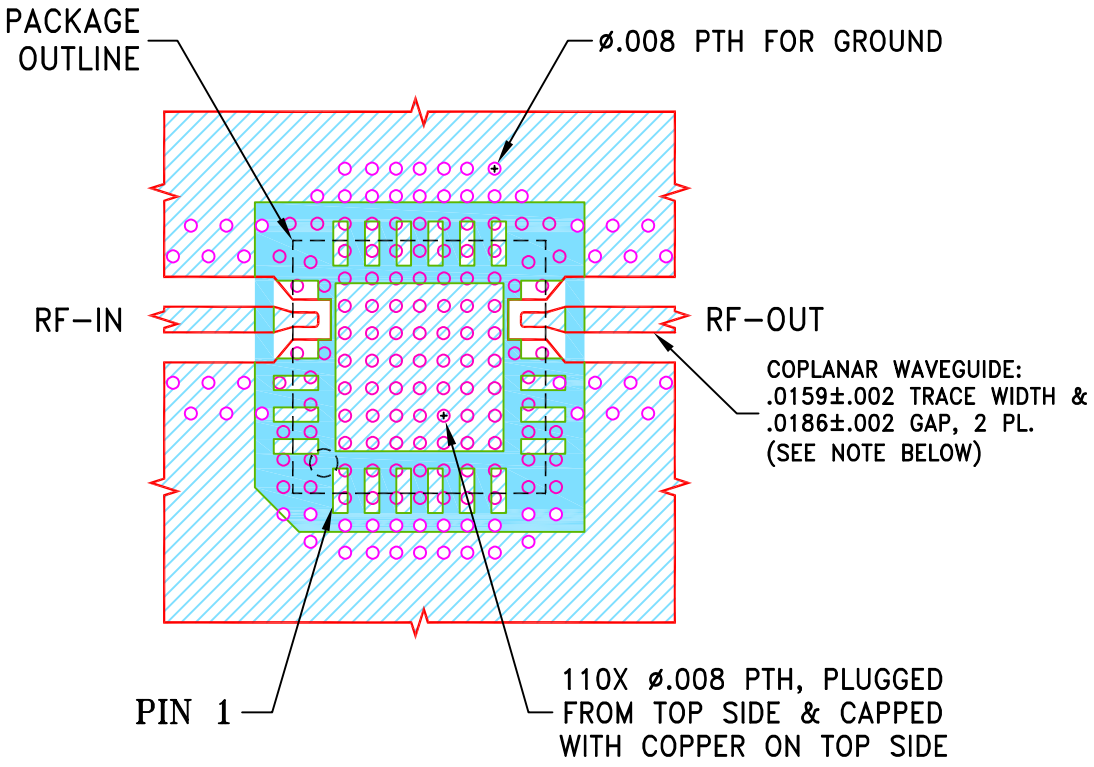
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-013714	NEW RELEASE	06/13/22	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR DG1847 CASE STYLE



NOTES:

1. TRACE WIDTH AND GAP PARAMETERS ARE SHOWN FOR ROGERS RO4003 WITH DIELECTRIC THICKNESS .008±.0007"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. UNIT FOOT PRINT IS OPTIMIZED FOR PERFORMANCE AND IS DIFFERENT FROM CASE STYLE DG1847 RECOMMENDATIONS.
3. 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	ITG	06/13/22
TOLERANCES ON:	CHECKED	GF	06/13/22
2 PL DECIMALS ±	APPROVED	IL	06/13/22
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

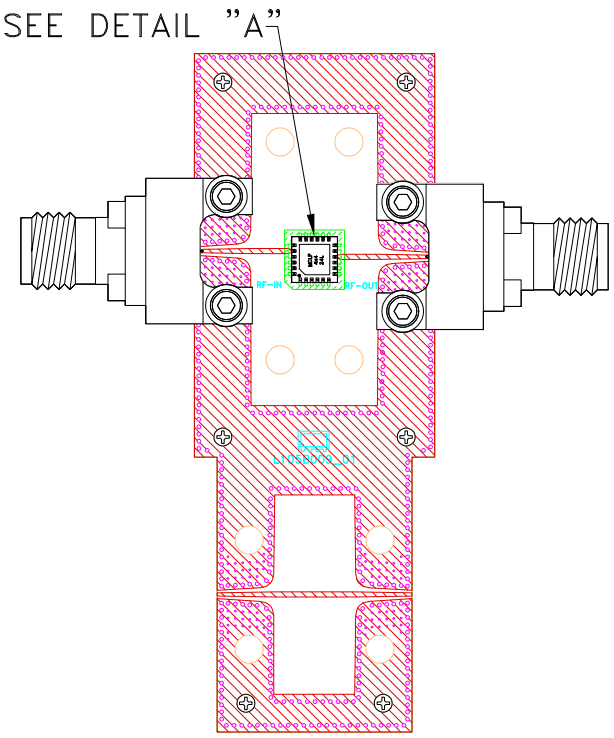
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

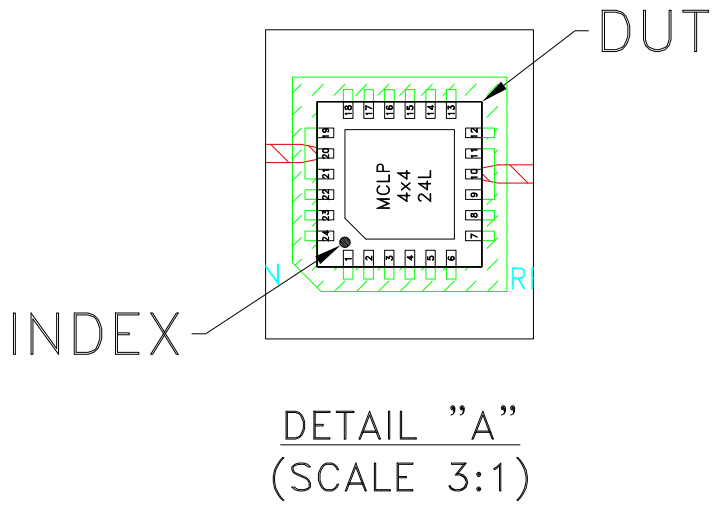
PL, DG1847, TB-CY3-223(C)+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-732	OR

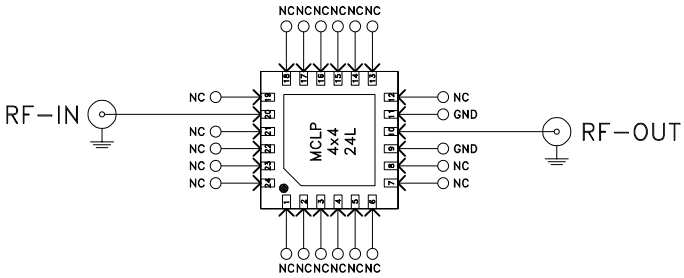
FILE:	SCALE:	SHEET:
98PL732	8:1	1 OF 1

Evaluation Board and Circuit





DETAIL "A"
(SCALE 3:1)



THRU LINE

SCHEMATIC DIAGRAM
(SCALE 3:1)

Function	Pad
RF-IN	20
RF-OUT	10
GND	9,11
NC (Ground Externally)	1-8,12-19,21-24

NOTES:

1. 1.85mm Female Connectors.
2. PCB Material: Roger RO4003C or equivalent, Dielectric constant=3.5, Thickness=0.008 inch

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Environmental Specifications **ENV08T1**

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	-40° to 85° C or -45° to 85° C or -55° to 105° C or -40° to 105° C or -40° to 95° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° Ambient Environment	Individual Model Data Sheet
HTOL	1000 hours at 125°C	MIL-STD-883, Method 1005, Condition B
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Mechanical Shock	1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only	MIL-STD-883, Method 2002, Condition B, except Y1 direction only
Vibration (Variable Frequency)	50g peak	MIL-STD-883, Method 2007, Condition B
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102, Condition C
HAST	130°C, 85% RH, 96 hours	JESD22-A110
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak	J-STD-020

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
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