X2 *MMIC Surface Mount*

Frequency Multiplier CY2-143+

50Ω Output 4 to 14 GHz

The Big Deal

- Ultra-wideband, output from 4 to 14 GHz
- Wide input power range, +12 to +18 dBm
- Low conversion loss, 12 dB
- Good fundamental and harmonic suppression: F1, 30 dBc; F3, 32 dBc
- Tiny size, 4 x 4 x 1mm
- Low cost

CASE STYLE: DG1847

Product Overview

Mini-Circuits' CY2-143+ is an ultra-wideband MMIC frequency doubler, converting input frequencies from 2 to 7 GHz into output frequencies from 4 to 14 GHz. Its wide output range makes this model suitable for broadband systems as well as a wide variety of narrowband applications. Utilizing GaAs HBT technology, the multiplier comes housed in a tiny 4 x 4 x 1mm MCLP package and offers excellent repeatability, low inductance, good thermal efficiency, and low cost.

Key Features

Feature	Advantages
Broadband, 4 to 14 GHz output	With an output frequency range spanning 4 to 14 GHz, this multiplier supports broadband applications such as defense and instrumentation as well as a wide range of narrowband system requirements.
Low conversion loss, 12 dB typ.	With a low conversion loss, CY2-143+ produces higher output power, reducing the need for amplification.
Excellent fundamental and harmonic suppression: • F1, 30 dBc • F3, 32 dBc • F4, 17 dBc	Reduces spurious signals and the need for additional filtering.
Wide input power range, +12 to +18 dBm	Wide input power signal range accommodates different input signal levels while still maintaining a low conversion loss.
4 x 4mm, 24 lead MCLP package	Low inductance, repeatable transitions, and excellent thermal contact to the PCB
Low cost	Provides an easy, cost-effective solution for generating high-frequency signals from a lower frequency signal source.

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Frequency Multiplier

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

Maximum Ratings

Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
RF Input Power	21 dBm

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

Pad Connections

INPUT	3
OUTPUT	16
GROUND	2,4,15,17, Paddle
NO CONNECTIONS	all others

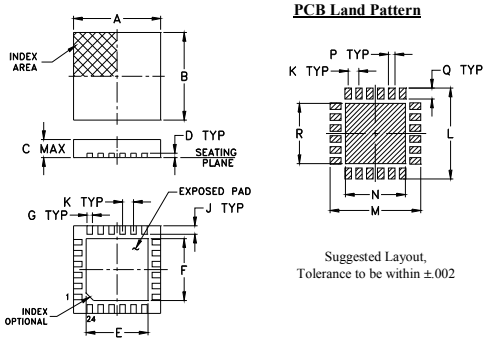
Features

- wideband, output 4 to 14 GHz
- low conversion loss, 12 dB typ.
- high fundamental & harmonic suppression, F1, 30 dBc typ.; F3, 32 dBc typ.; F4, 17 dBc typ.
- miniature size 4x4x1mm
- aqueous washable

Applications

- synthesizers
- local oscillators

Outline Drawing

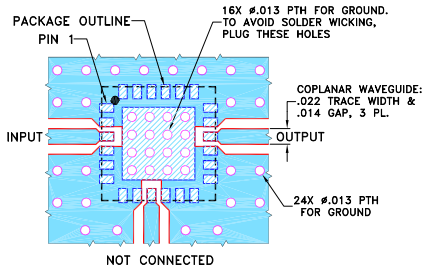


Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J
.157	.157	.039	.008	.104	.104	.009	--	.016
4.0	4.0	1.0	0.20	2.64	2.64	0.23	--	0.41

K	L	M	N	P	Q	R	wt
.020	.166	.166	.102	.012	.020	.102	grams
0.50	4.22	4.22	2.59	0.30	0.51	2.59	0.04

Demo Board MCL P/N: TB-851-143+
Suggested PCB Layout (PL-476)



NOTES:
1. TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
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.

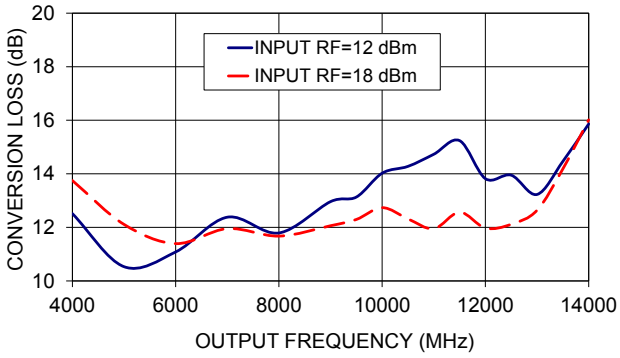
Parameter		Frequency (GHz)	Min.	Typ.	Max.	Unit
Multiplier Factor				2		
Frequency Range, Input (F1)			2	—	4	GHz
			4	—	7	
Frequency Range, Output (F2)			4	—	8	GHz
			8	—	14	
Input Power			12	—	18	dBm
Conversion Loss		4 - 8	—	12	14.5	dB
		8 - 14	—	13	19.2	
Harmonic Output*	F1	4 - 8	19	30	—	dBc
		8 - 14	17	27	—	
	F3	4 - 8	20	32	—	
		8 - 14	21	39	—	
	F4	4 - 8	11	17	—	
		8 - 14	12	27	—	

* Harmonics of input frequency below the power level of F2

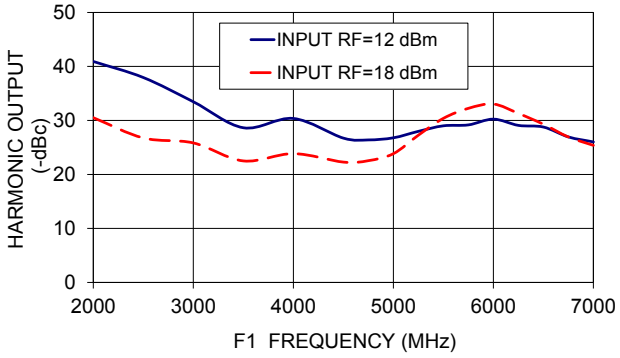
Typical Performance Data

Input Frequency (MHz)	INPUT RF= 12 dBm Conversion Loss (dB)	Harmonic Output Below F2 (-dBc)			INPUT RF= 18 dBm Conversion Loss (dB)	Harmonic Output Below F2 (-dBc)		
	F2	F1	F3	F4	F2	F1	F3	F4
2000	12.51	40.92	33.76	15.87	13.75	30.50	22.90	14.10
2500	10.53	37.94	37.00	14.66	12.11	26.75	24.89	16.92
3000	11.08	33.46	37.04	15.55	11.39	25.83	24.69	22.32
3500	12.38	28.64	35.79	16.22	11.95	22.50	24.04	17.78
4000	11.79	30.37	38.63	25.62	11.68	23.85	27.03	21.81
4500	12.96	26.72	36.23	38.06	12.06	22.28	28.45	28.64
4750	13.13	26.39	36.75	40.80	12.30	22.55	30.69	26.12
5000	14.02	26.78	38.07	38.98	12.74	23.84	33.88	22.71
5250	14.28	27.98	49.62	28.39	12.32	27.27	38.61	21.76
5500	14.73	29.00	60.05	20.95	11.95	30.39	43.81	19.50
5750	15.24	29.17	48.47	21.47	12.57	32.24	49.94	18.66
6000	13.82	30.24	42.36	29.24	11.98	33.03	46.20	23.98
6250	13.95	29.08	45.37	35.00	12.12	31.30	45.25	28.35
6500	13.23	28.77	42.70	33.39	12.64	29.29	42.22	30.69
6750	14.46	26.94	41.63	34.68	14.18	26.93	38.24	32.55
7000	15.86	26.02	39.73	32.68	16.02	25.38	37.86	31.60

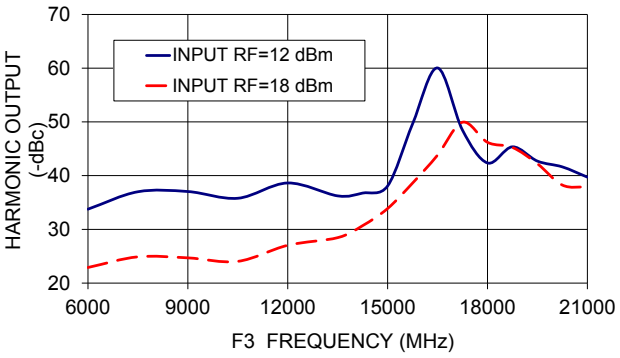
CY2-143+
CONVERSION LOSS



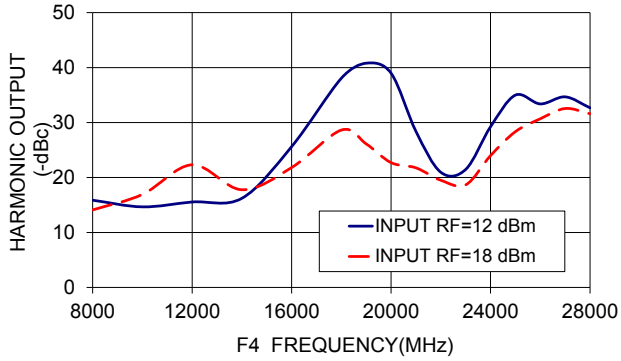
CY2-143+
HARMONIC OUTPUT F1



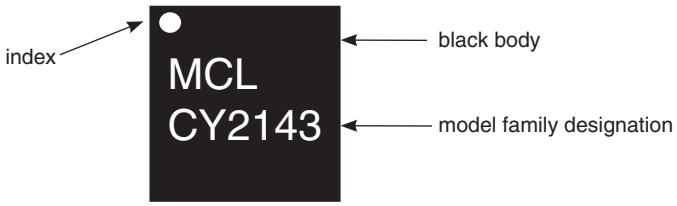
CY2-143+
HARMONIC OUTPUT F3



CY2-143+
HARMONIC OUTPUT F4



Product Marking



Additional 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.
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