

Surface Mount

Voltage Controlled Oscillator

JTOS-400+

Linear Tuning 200 to 380 MHz

Features

- wide frequency range
- linear tuning characteristics
- excellent harmonic suppression
- low phase noise

Applications

- PLL circuitry
- measurement instrumentation



Generic photo used for illustration purposes only

CASE STYLE: BK377

+RoHS Compliant

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

Electrical Specifications

FREQUENCY (MHz)		POWER OUTPUT (dBm)	TUNING VOLTAGE (V)		PHASE NOISE (dBc/Hz) SSB at offset frequencies: Typ.				PULLING pk-pk @ 12 dB (MHz)	PUSHING (MHz/V)	TUNING SENSITIVITY (MHz/V)	HARMONICS (dBc)		3 dB MODULATION BANDWIDTH (MHz)	DC OPERATING POWER	
Min.	Max.	Typ.	Min.	Max.	1 kHz	10 kHz	100 kHz	1 MHz	Typ.	Typ.	Typ.	Typ.	Max.	Typ.	V _{cc} (volts)	Current (mA) Max.
200	380	+9.0	1	16	-82	-102	-122	-142	1.4	0.4	10.5-17.1	-25	-20	0.13	12	20

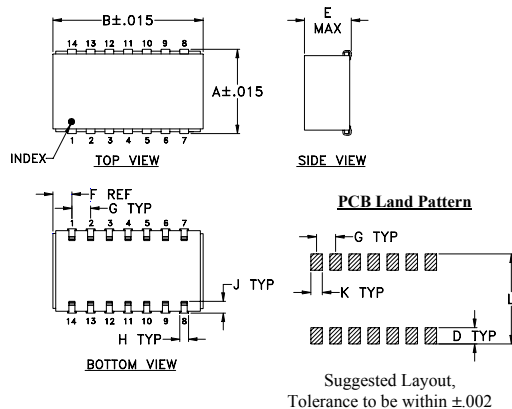
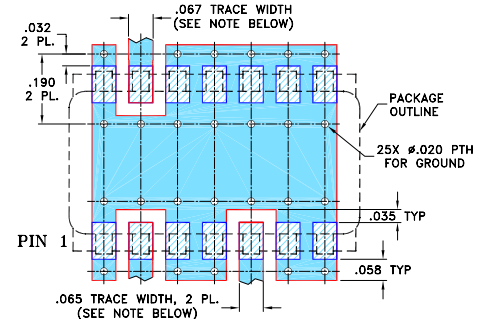
Pin Connections

RF OUT	13
VCC	2
V-TUNE	5
GROUND	1,3,4,6,7,8,9,10,11,12,14

Maximum Ratings

Operating Temperature	-55°C to 85°C
Storage Temperature	-55°C to 100°C
Absolute Max. Supply Voltage (Vcc)	+16V
Absolute Max. Tuning Voltage (Vtune)	+18V
all specifications: 50 ohm system	
Permanent damage may occur if any of these limits are exceeded.	

Outline Drawing

Demo Board MCL PIN: TB-04
Suggested PCB Layout (PL-005)

NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .002"; 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

Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H	J	K	L	wt
.505	.800	--	.100	.250	.100	.100	.047	.065	.065	.525	grams
12.83	20.32	--	2.54	6.35	2.54	2.54	1.19	1.65	1.65	13.34	3.0

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/MCLStore/terms.jsp

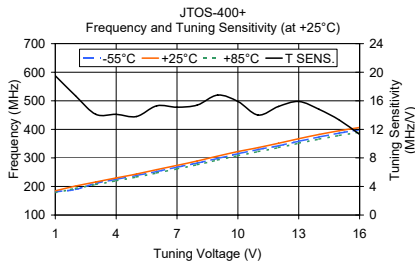


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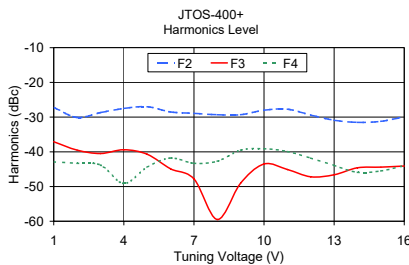
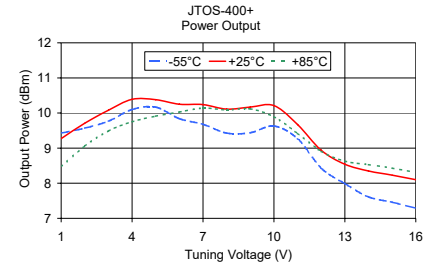
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Performance Data & Curves

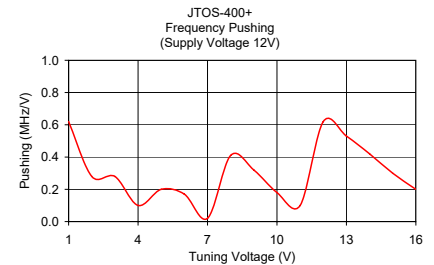
JTOS-400+



V TUNE	TUNING SENS. (MHz/V)	FREQUENCY (MHz)			POWER OUTPUT (dBm)		
		-55°C	+25°C	+85°C	-55°C	+25°C	+85°C
1.00	19.50	181.60	184.88	178.08	9.43	9.27	8.47
2.00	16.70	189.70	201.58	193.38	9.57	9.71	9.06
3.00	14.10	211.25	215.71	207.00	9.77	10.08	9.49
4.00	14.10	224.98	229.83	220.17	10.10	10.39	9.75
5.00	13.80	238.65	243.63	233.22	10.17	10.38	9.91
6.00	15.30	252.53	258.88	247.43	9.84	10.25	10.03
7.00	15.10	267.80	273.95	261.75	9.68	10.24	10.14
8.00	15.40	282.13	289.35	276.48	9.43	10.11	10.09
9.00	16.80	298.35	306.18	292.55	9.44	10.17	10.12
10.00	15.90	314.65	322.08	308.05	9.63	10.21	9.89
11.00	14.00	329.68	336.13	322.25	9.27	9.67	9.42
12.00	15.20	342.40	351.32	336.42	8.43	8.94	8.91
13.00	15.90	358.26	367.18	351.48	7.99	8.54	8.63
14.00	14.80	373.38	382.00	365.85	7.61	8.35	8.53
15.00	13.30	386.98	395.30	378.86	7.46	8.23	8.43
16.00	11.30	398.75	406.65	390.35	7.29	8.10	8.31



V TUNE	HARMONICS (dBc)			FREQ. PUSHING (MHz/V)
	F2	F3	F4	
1.00	-27.20	-37.10	-42.90	0.62
2.00	-30.10	-39.50	-43.30	0.28
3.00	-28.70	-40.50	-43.80	0.28
4.00	-27.50	-39.40	-49.10	0.10
5.00	-27.00	-40.70	-44.40	0.20
6.00	-28.50	-44.90	-41.80	0.17
7.00	-28.90	-47.80	-43.30	0.02
8.00	-29.30	-59.50	-42.70	0.41
9.00	-29.30	-49.00	-39.50	0.32
10.00	-28.00	-43.50	-39.10	0.18
11.00	-27.70	-45.10	-39.90	0.10
12.00	-29.40	-47.20	-41.80	0.62
13.00	-30.90	-46.60	-43.90	0.53
14.00	-31.50	-44.60	-45.90	0.42
15.00	-31.20	-44.40	-45.50	0.30
16.00	-29.90	-44.10	-44.00	0.20



Notes

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Voltage Controlled Oscillator

JTOS-400+

Typical Performance Data

V TUNE	TUNE SENS (MHz/V)	FREQUENCY (MHz)			POWER OUTPUT (dBm)			HARMONICS (dBc)			FREQ. PUSH (MHz/V)	FREQ OFFSET (KHz)	PHASE NOISE (dBc/Hz)
		-55°C	+25°C	+85°C	-55°C	+25°C	+85°C	F2	F3	F4			
1.0	19.50	181.6	184.9	178.1	9.43	9.27	8.47	-27.2	-37.1	-42.9	0.62	1	-82
2.0	16.70	189.7	201.6	193.4	9.57	9.71	9.06	-30.1	-39.5	-43.3	0.28	10	-102
3.0	14.10	211.3	215.7	207.0	9.77	10.08	9.49	-28.7	-40.5	-43.8	0.28	100	-122
4.0	14.10	225.0	229.8	220.2	10.10	10.39	9.75	-27.5	-39.4	-49.1	0.10	1000	-142
5.0	13.80	238.7	243.6	233.2	10.17	10.38	9.91	-27.0	-40.7	-44.4	0.20		
6.0	15.30	252.5	258.9	247.4	9.84	10.25	10.03	-28.5	-44.9	-41.8	0.17		
7.0	15.10	267.8	274.0	261.8	9.68	10.24	10.14	-28.9	-47.8	-43.3	0.02		
8.0	15.40	282.1	289.4	276.5	9.43	10.11	10.09	-29.3	-59.5	-42.7	0.41		
9.0	16.80	298.4	306.2	292.6	9.44	10.17	10.12	-29.3	-49.0	-39.5	0.32		
10.0	15.90	314.7	322.1	308.1	9.63	10.21	9.89	-28.0	-43.5	-39.1	0.18		
11.0	14.00	329.7	336.1	322.3	9.27	9.67	9.42	-27.7	-45.1	-39.9	0.10		
12.0	15.20	342.4	351.3	336.4	8.43	8.94	8.91	-29.4	-47.2	-41.8	0.62		
13.0	15.90	358.3	367.2	351.5	7.99	8.54	8.63	-30.9	-46.6	-43.9	0.53		
14.0	14.80	373.4	382.0	365.9	7.61	8.35	8.53	-31.5	-44.6	-45.9	0.42		
15.0	13.30	387.0	395.3	378.9	7.46	8.23	8.43	-31.2	-44.4	-45.5	0.30		
16.0	11.30	398.8	406.7	390.4	7.29	8.10	8.31	-29.9	-44.1	-44.0	0.20		

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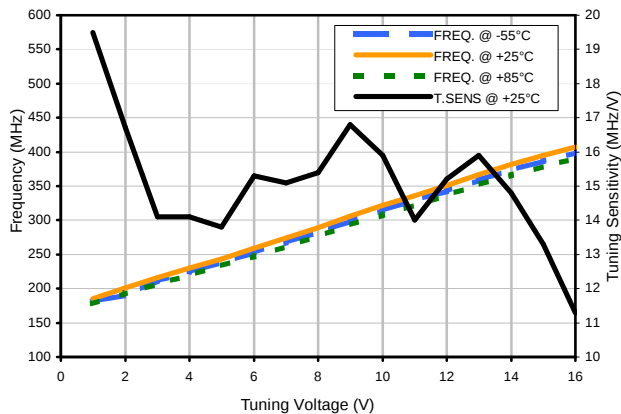


Voltage Controlled Oscillator

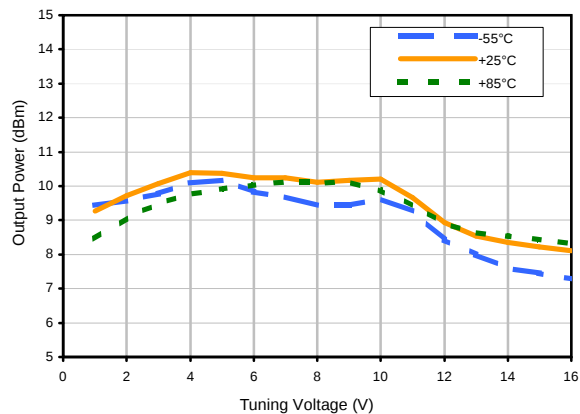
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Typical Performance Data

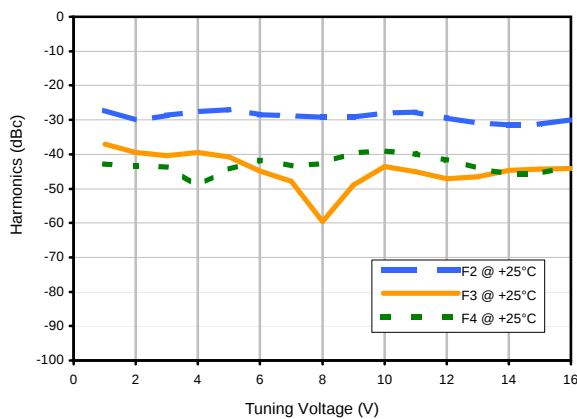
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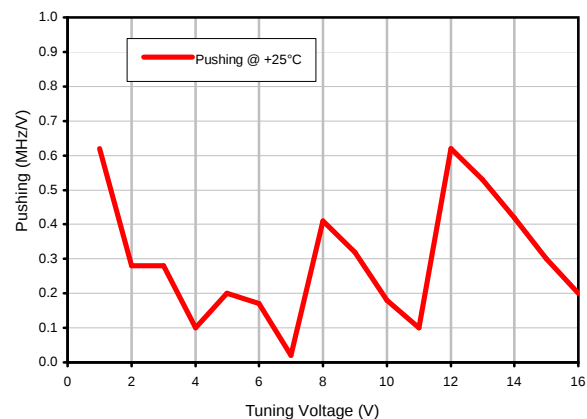
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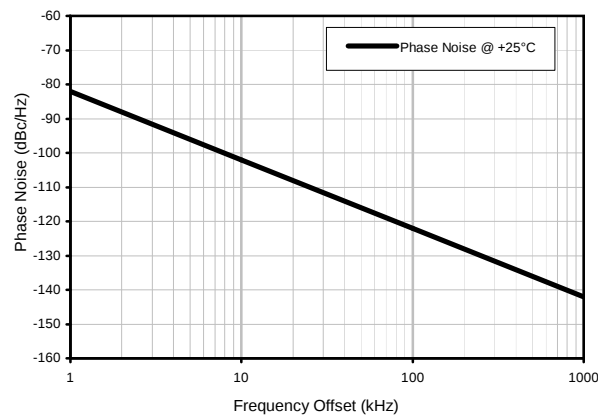
Harmonics Level



Frequency Pushing



Phase Noise



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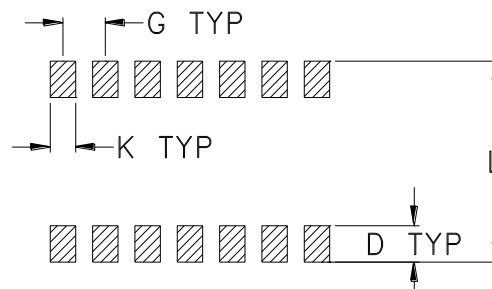
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Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	WT. GRAM
BK377	.505 (12.83)	.800 (20.32)	-- --	.100 (2.54)	.250 (6.35)	.100 (2.54)	.100 (2.54)	.047 (1.19)	.065 (1.65)	.065 (1.65)	.525 (13.34)	2.0 MAX.

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

Notes:

- Case material: Copper Nickel alloy.
- Base material: Printed wiring laminate.
- Termination finish:
 - For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



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Tape & Reel Packaging TR-F107

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
32	20	7	Small quantity standards (see note)	10
				20
				50
				100
		13	Standard	200

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.

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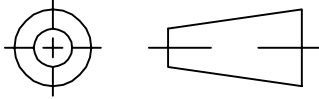
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THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
B	M76077	UPDATED DRAWING	04/01	GF	MM
C	M82575	UPDATED DRAWING	08/08/02	IL	MM
D	M102713	UPDATED DIMENSIONS & NOTES	01/17/06	MMG	IL
E	M115059	CORRECTED NOTE 2	12/18/07	MMG	IL

SUGGESTED MOUNTING CONFIGURATION FOR BK377 CASE STYLE, "jc" PIN CONNECTION



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" $\pm$.002"; 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)

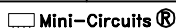


DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$ 

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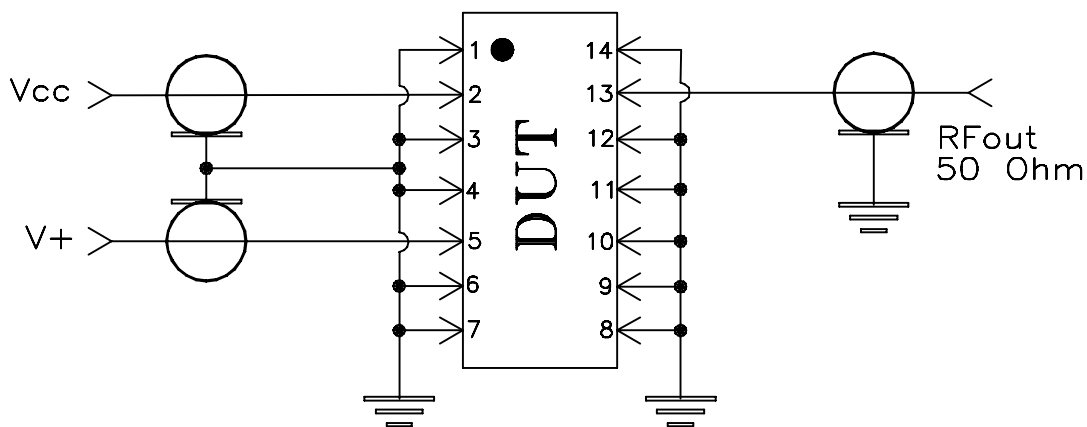
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Evaluation Board and Circuit



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

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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 85°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
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutectic Process: 225°C peak Pb-Free Process, 245°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, 20-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-883, Method 2007.3, Condition A
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
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