

Voltage Controlled Oscillator

SOS-656PV-119+

5V Tuning for PLL IC's 632 to 656 MHz

Features

- linear tuning characteristics
- low phase noise
- low pushing
- low pulling
- small size 0.3" x 0.3"
- aqueous washable

Applications

- wireless communications
- personal & home communication



CASE STYLE: FZ802

PRICE: \$ 20.60 ea. QTY (5-49)

+RoHS Compliant

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

Electrical Specifications

MODEL NO.	FREQ. (MHz)		POWER OUTPUT (dBm)	PHASE NOISE				TUNING					NON HARMONIC SPURIOUS (dBc)	HARMONICS (dBc)		PULLING pk-pk @12 dB _r (MHz)	PUSHING (MHz/V)	DC OPERATING POWER	
				dBc/Hz SSB at offset frequencies,kHz				VOLTAGE RANGE	SENSI- TIVITY	PORT CAP	3 dB MODULATION	V _{cc}						Current	
	Typ.				(V)	(MHz/V)	(pF)	BANDWIDTH (MHz)	(volts)	(mA)									
	Min.	Max.	Typ.	1	10	100	1000	Min.	Max.	Typ.	Typ.	Typ.	Typ.	Typ.	Max.	Typ.	Typ.	Max.	
SOS-656PV-119+	632	656	-0.4	-89	-113	-133	-152	0.5	4.5	11	125	25	-90	-14	-	0.3	0.1	5 20	

Pin Connections

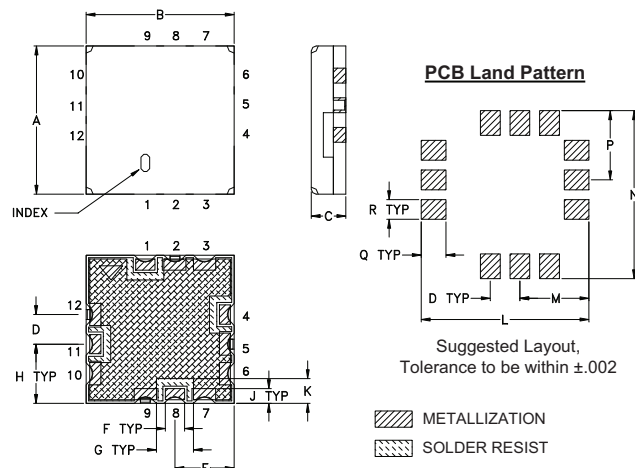
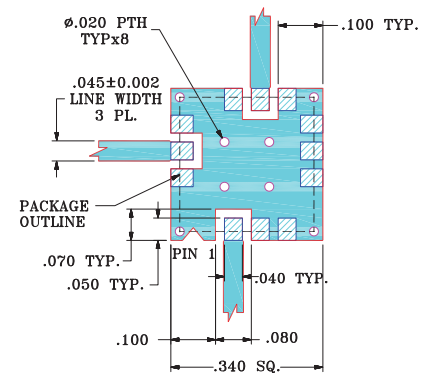
RF OUT	8
VCC	11
V-TUNE	1
GROUND	2,3,4,5,6,7,9,10,12

Maximum Ratings

Operating Temperature	-55°C to 85°C
Storage Temperature	-55°C to 100°C
Absolute Max. Supply Voltage (Vcc)	7V
Absolute Max. Tuning Voltage (Vtune)	7V
All specifications	50 ohm system

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

Outline Drawing

Demo Board MCL P/N: TB-271
Suggested PCB Layout (PL-143)

NOTE:

1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025"±0.002"; 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	M	N	P	Q	R	wt.
.300	.300	.070	.060	.120	.039	.075	.120	.030	.050	.340	.140	.340	.140	.050	.040	grams
7.62	7.62	1.78	1.52	3.05	0.99	1.91	3.05	0.76	1.27	8.64	3.56	8.64	3.56	1.27	1.02	.25



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 The Design Engineers Search Engine Provides ACTUAL Data Instantly at minicircuits.com

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet 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.

For detailed performance specs
& shopping online see web site

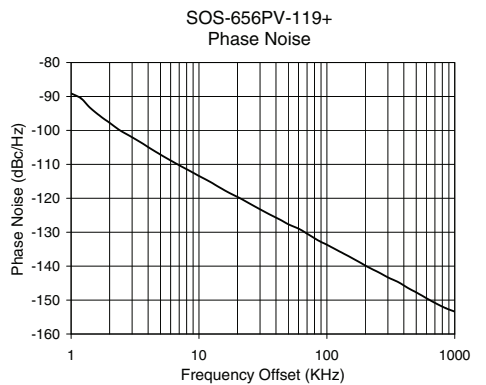
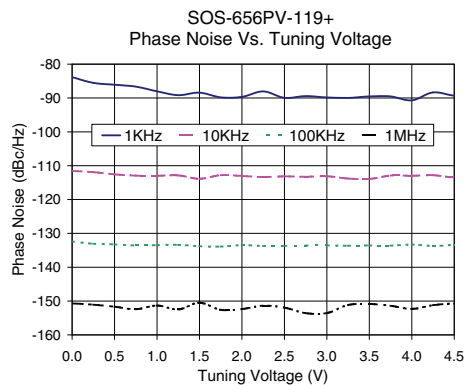
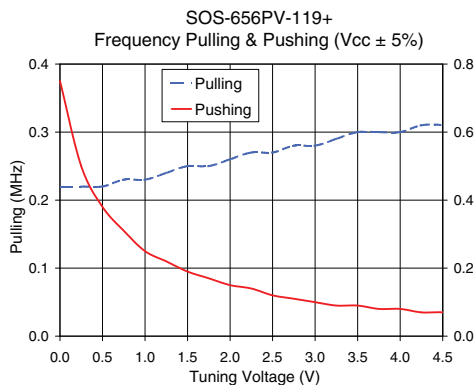
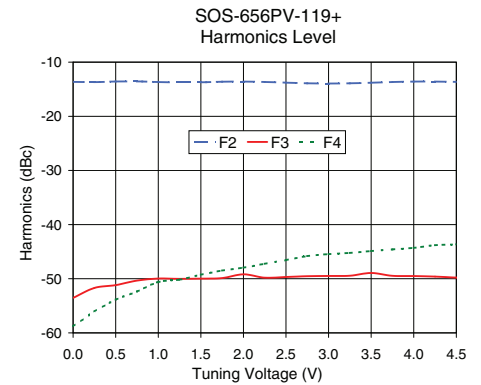
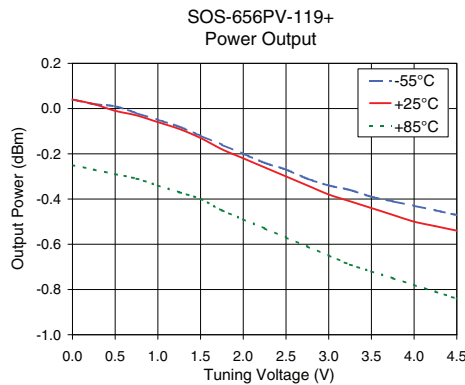
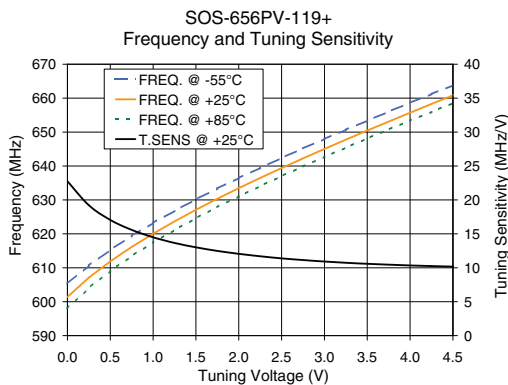
REV. OR
M122533
EDR-8970F1
SOS-656PV-119+
RAV
121009
Page 1 of 2

Performance Data & Curves*

SOS-656PV-119+

V TUNE	TUNE SENS (MHz/V)	FREQUENCY (MHz)			POWER OUTPUT (dBm)			Icc (mA)	HARMONICS (dBc)			FREQ. PUSH (MHz/V)	FREQ. PULL (MHz)	PHASE NOISE (dBc/Hz) at offsets				FREQ OFFSET (KHz)	PHASE NOISE at 644 MHz (dBc/Hz)
		-55°C	+25°C	+85°C	-55°C	+25°C	+85°C		F2	F3	F4			1kHz	10kHz	100kHz	1MHz		
0.00	22.75	605.3	601.4	598.0	0.04	0.04	-0.25	15.20	-13.7	-53.5	-58.8	0.75	0.22	-83.9	-111.6	-132.4	-150.7	1.0	-89.10
0.25	19.21	610.7	607.1	604.1	0.02	0.02	-0.27	15.22	-13.7	-51.7	-56.1	0.50	0.22	-85.5	-111.9	-133.1	-151.1	2.0	-97.76
0.50	17.06	615.3	611.9	609.1	0.01	-0.01	-0.29	15.22	-13.6	-51.2	-53.9	0.38	0.22	-86.1	-112.6	-133.3	-151.7	3.5	-103.53
0.75	15.58	619.4	616.2	613.5	-0.02	-0.03	-0.31	15.23	-13.6	-50.3	-52.4	0.31	0.23	-86.6	-113.0	-133.6	-152.4	6.0	-108.85
1.00	14.50	623.2	620.0	617.4	-0.05	-0.06	-0.34	15.24	-13.7	-50.0	-50.6	0.25	0.23	-88.0	-113.0	-133.5	-151.3	8.5	-111.96
1.25	13.67	626.8	623.7	621.1	-0.08	-0.09	-0.37	15.25	-13.7	-50.0	-50.2	0.22	0.24	-89.2	-112.9	-133.4	-152.5	10.0	-113.41
1.50	13.01	630.1	627.1	624.6	-0.12	-0.13	-0.40	15.25	-13.7	-50.0	-49.3	0.19	0.25	-88.4	-113.9	-133.8	-150.5	20.8	-119.92
1.75	12.48	633.4	630.3	627.9	-0.16	-0.18	-0.45	15.26	-13.6	-49.9	-48.5	0.17	0.25	-89.8	-112.8	-133.9	-152.6	35.5	-124.71
2.00	12.05	636.5	633.5	631.0	-0.20	-0.22	-0.49	15.26	-13.6	-49.2	-48.0	0.15	0.26	-89.7	-113.0	-133.5	-152.4	60.7	-129.05
2.25	11.69	639.4	636.5	634.1	-0.24	-0.26	-0.53	15.26	-13.7	-49.8	-47.3	0.14	0.27	-88.0	-113.4	-133.7	-151.4	86.7	-132.54
2.50	11.39	642.4	639.4	637.0	-0.27	-0.30	-0.57	15.27	-13.8	-49.7	-46.6	0.12	0.27	-89.9	-113.2	-133.7	-151.9	100.0	-133.69
2.75	11.14	645.2	642.2	639.9	-0.31	-0.34	-0.61	15.27	-13.9	-49.5	-45.8	0.11	0.28	-89.5	-113.3	-133.6	-153.6	148.1	-137.08
3.00	10.92	648.0	645.0	642.7	-0.34	-0.38	-0.65	15.27	-14.0	-49.5	-45.5	0.10	0.28	-89.8	-113.1	-133.6	-153.6	211.6	-140.34
3.25	10.73	650.7	647.8	645.4	-0.36	-0.41	-0.69	15.28	-13.9	-49.4	-45.2	0.09	0.29	-90.0	-113.8	-133.7	-151.2	302.4	-143.39
3.50	10.58	653.4	650.4	648.1	-0.39	-0.44	-0.72	15.28	-13.8	-48.9	-44.9	0.09	0.30	-89.5	-113.9	-133.6	-150.9	361.5	-144.70
3.75	10.45	656.0	653.1	650.8	-0.41	-0.47	-0.75	15.28	-13.7	-49.5	-44.6	0.08	0.30	-89.5	-112.9	-133.6	-151.4	507.5	-147.86
4.00	10.34	658.6	655.7	653.4	-0.43	-0.50	-0.78	15.28	-13.6	-49.5	-44.3	0.08	0.30	-90.7	-113.0	-133.3	-152.3	606.7	-149.54
4.25	10.25	661.2	658.3	656.0	-0.45	-0.52	-0.81	15.29	-13.6	-49.6	-43.8	0.07	0.31	-88.4	-112.8	-133.7	-151.2	851.6	-152.41
4.50	10.17	663.8	660.8	658.5	-0.47	-0.54	-0.84	15.29	-13.6	-49.8	-43.7	0.07	0.31	-89.3	-113.4	-133.5	-150.8	1000.0	-153.40

*at 25°C unless mentioned otherwise



Voltage Controlled Oscillator

SOS-656PV-119+

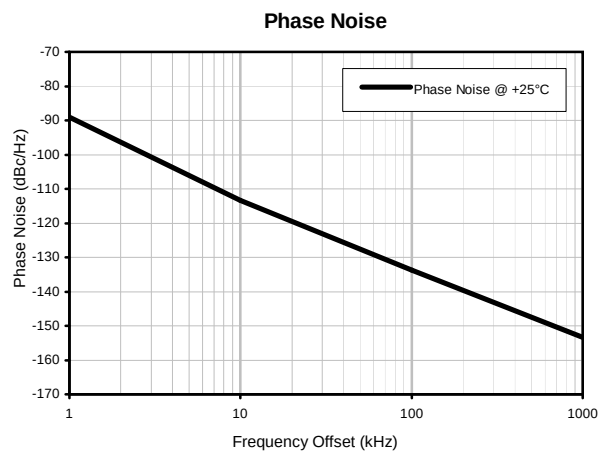
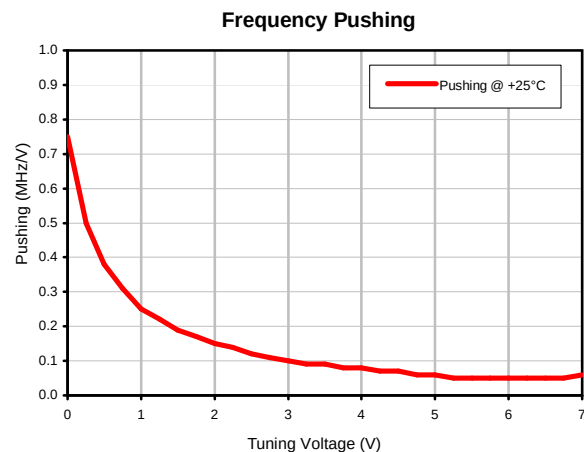
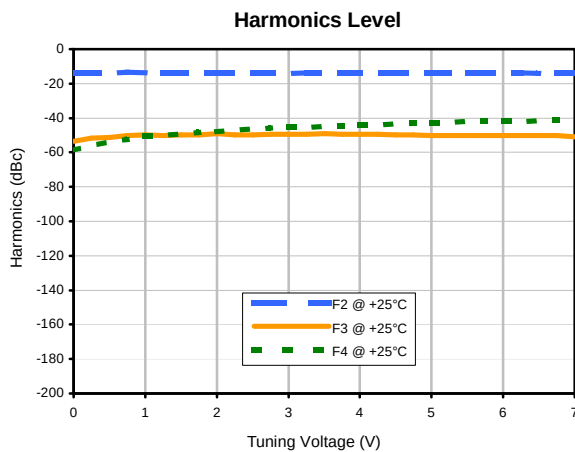
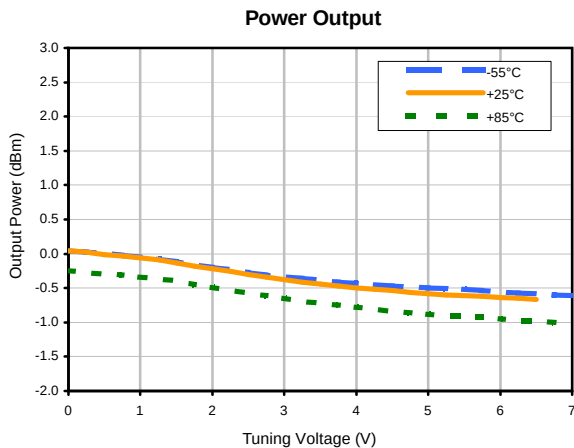
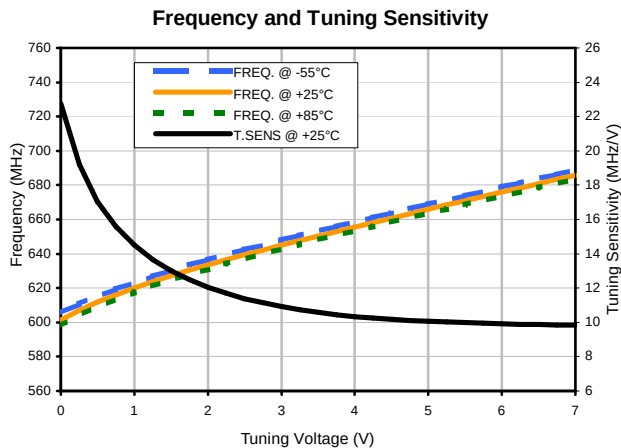
Typical Performance Data

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			
0.0	22.75	605.34	601.40	597.97	0.04	0.04	-0.25	-13.65	-53.54	-58.79	0.75	1	-89
0.3	19.21	610.67	607.09	604.06	0.02	0.02	-0.27	-13.69	-51.70	-56.05	0.50	10	-113
0.5	17.06	615.27	611.89	609.07	0.01	-0.01	-0.29	-13.57	-51.18	-53.85	0.38	100	-134
0.8	15.58	619.41	616.15	613.46	-0.02	-0.03	-0.31	-13.56	-50.34	-52.35	0.31	1000	-153
1.0	14.50	623.22	620.05	617.45	-0.05	-0.06	-0.34	-13.67	-49.96	-50.60	0.25		
1.3	13.67	626.78	623.67	621.14	-0.08	-0.09	-0.37	-13.73	-50.03	-50.17	0.22		
1.5	13.01	630.15	627.09	624.60	-0.12	-0.13	-0.40	-13.71	-49.98	-49.26	0.19		
1.8	12.48	633.36	630.34	627.89	-0.16	-0.18	-0.45	-13.62	-49.88	-48.49	0.17		
2.0	12.05	636.45	633.46	631.04	-0.20	-0.22	-0.49	-13.59	-49.19	-47.96	0.15		
2.3	11.69	639.44	636.47	634.08	-0.24	-0.26	-0.53	-13.66	-49.80	-47.25	0.14		
2.5	11.39	642.35	639.40	637.02	-0.27	-0.30	-0.57	-13.79	-49.68	-46.56	0.12		
2.8	11.14	645.18	642.24	639.88	-0.31	-0.34	-0.61	-13.90	-49.53	-45.82	0.11		
3.0	10.92	647.96	645.03	642.68	-0.34	-0.38	-0.65	-13.95	-49.49	-45.45	0.10		
3.3	10.73	650.68	647.76	645.42	-0.36	-0.41	-0.69	-13.91	-49.44	-45.24	0.09		
3.5	10.58	653.36	650.44	648.11	-0.39	-0.44	-0.72	-13.80	-48.94	-44.89	0.09		
3.8	10.45	656.01	653.09	650.76	-0.41	-0.47	-0.75	-13.67	-49.46	-44.59	0.08		
4.0	10.34	658.62	655.70	653.38	-0.43	-0.50	-0.78	-13.58	-49.50	-44.30	0.08		
4.3	10.25	661.20	658.28	655.96	-0.45	-0.52	-0.81	-13.59	-49.61	-43.81	0.07		
4.5	10.17	663.77	660.84	658.53	-0.47	-0.54	-0.84	-13.64	-49.79	-43.65	0.07		
4.8	10.11	666.31	663.39	661.07	-0.48	-0.56	-0.86	-13.69	-49.92	-43.20	0.06		
5.0	10.06	668.84	665.91	663.60	-0.50	-0.58	-0.88	-13.73	-50.34	-42.79	0.06		
5.3	10.02	671.36	668.43	666.11	-0.51	-0.60	-0.90	-13.73	-50.31	-42.45	0.05		
5.5	9.98	673.87	670.93	668.62	-0.52	-0.61	-0.92	-13.74	-50.06	-42.14	0.05		
5.8	9.95	676.37	673.43	671.11	-0.54	-0.62	-0.93	-13.77	-50.26	-41.83	0.05		
6.0	9.92	678.87	675.92	673.60	-0.55	-0.64	-0.95	-13.84	-50.01	-41.85	0.05		
6.3	9.89	681.35	678.40	676.08	-0.57	-0.65	-0.96	-13.94	-50.09	-41.97	0.05		
6.5	9.86	683.83	680.87	678.55	-0.58	-0.67	-0.98	-14.03	-50.30	-41.64	0.05		
6.8	9.83	686.30	683.34	681.02	-0.60	-0.68	-1.00	-14.10	-50.15	-41.33	0.05		
7.0	9.83	688.77	685.79	683.48	-0.61	-0.70	-1.01	-14.11	-50.88	-40.99	0.06		

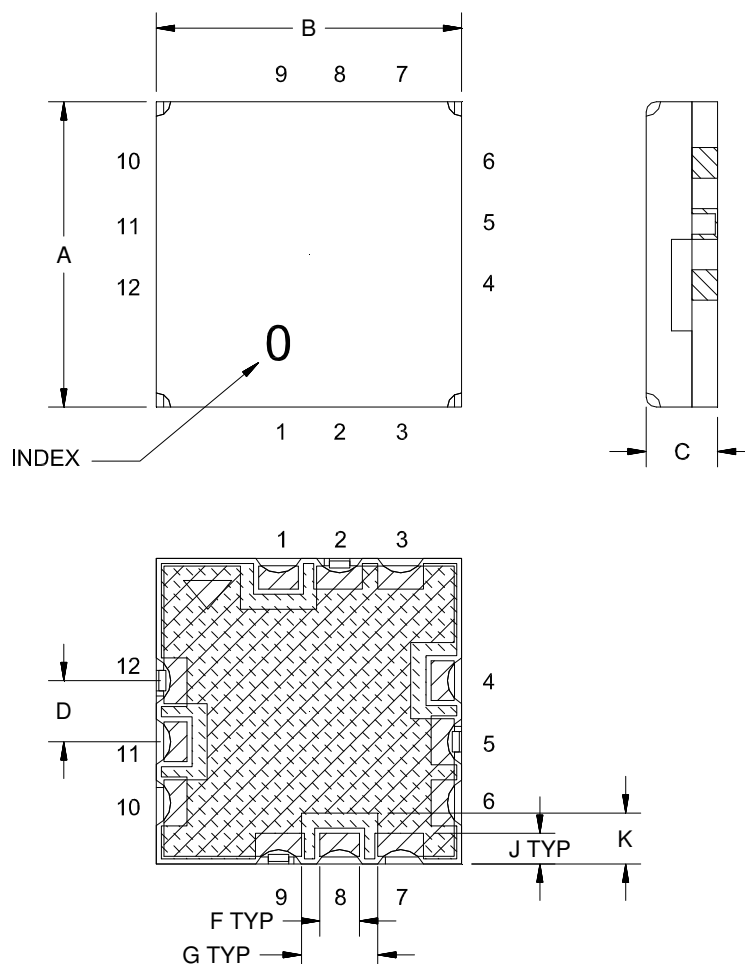
Voltage Controlled Oscillator

SOS-656PV-119+

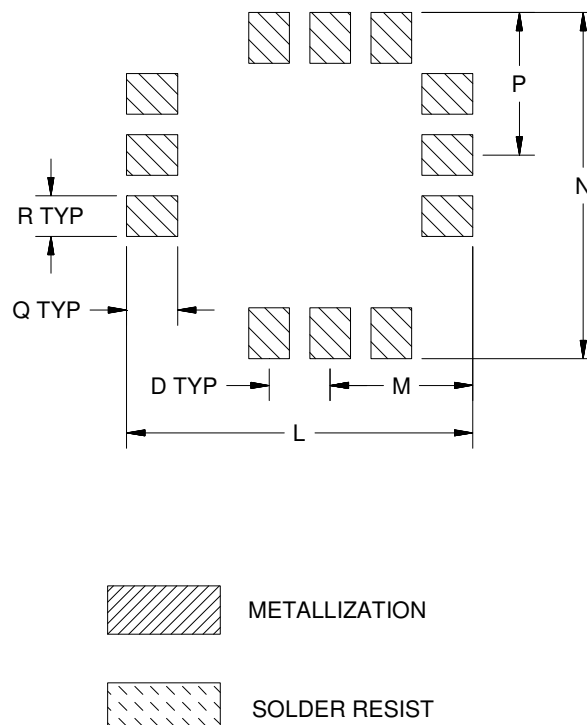
Typical Performance Data



Outline Dimensions



PCB Land Pattern



CASE #	A	B	C	D	E	F	G	H	J	K
FZ802	.300 (7.62)	.300 (7.62)	.070 (1.78)	.060 (1.52)	.120 (3.05)	.039 (0.99)	.075 (1.91)	.120 (3.05)	.030 (0.76)	.050 (1.27)

CASE #	L	M	N	P	Q	R	WT. GRAM
FZ802	.340 (8.64)	.140 (3.56)	.340 (8.64)	.140 (3.56)	.050 (1.27)	.040 (1.02)	.25

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$; 3Pl. $\pm .015$

Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:

For RoHS Case Styles: 3-5 μ inch (.08-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.



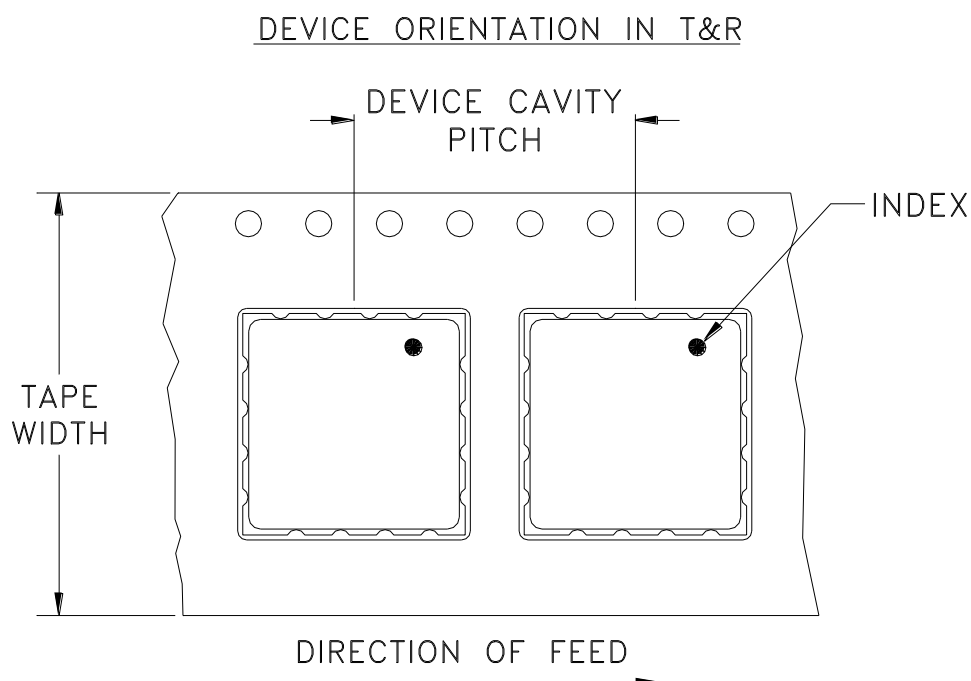
INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

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

Tape & Reel Packaging TR-F78



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note
16	12	7	10
			20
			50
			100
			200
		13	500, 1000

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

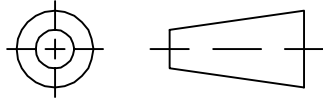
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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



INTERNET <http://www.minicircuits.com>
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
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

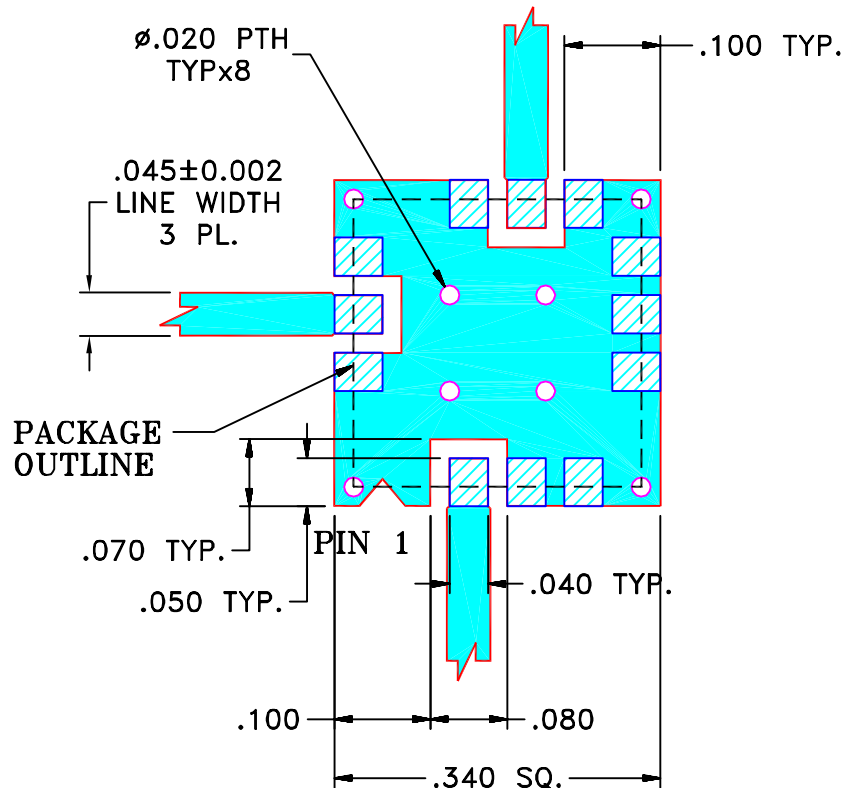
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M89039	NEW RELEASE (FROM RAVON)	01/04	DK	HH
OR	R54816	NEW RELEASE (FROM RAVON)	01/04	DK	HH
A	M102713	ADDED "...WITH SMOBC"	01/12/06	GF	IL

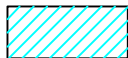
**SUGGESTED MOUNTING CONFIGURATION
FOR FZ802/FZ990 CASE STYLE, pl PIN CONNECTION.**

**NOTE:**

- TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS $.025" \pm .002"$; COPPER: 1/2 OZ. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- 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

DK (RAV)

19/01/04

TOLERANCES ON:

CHECKED

RZ (RAV)

19/01/04

2 PL DECIMALS $\pm$

APPROVED

HH (RAV)

19/01/04

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

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VEEDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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



Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

PL, pl, FZ802/FZ990, SOS, TB-271

SIZE

CODE IDENT

DRAWING NO:

REV:

A

15542

98-PL-143

A

FILE: 98PL143

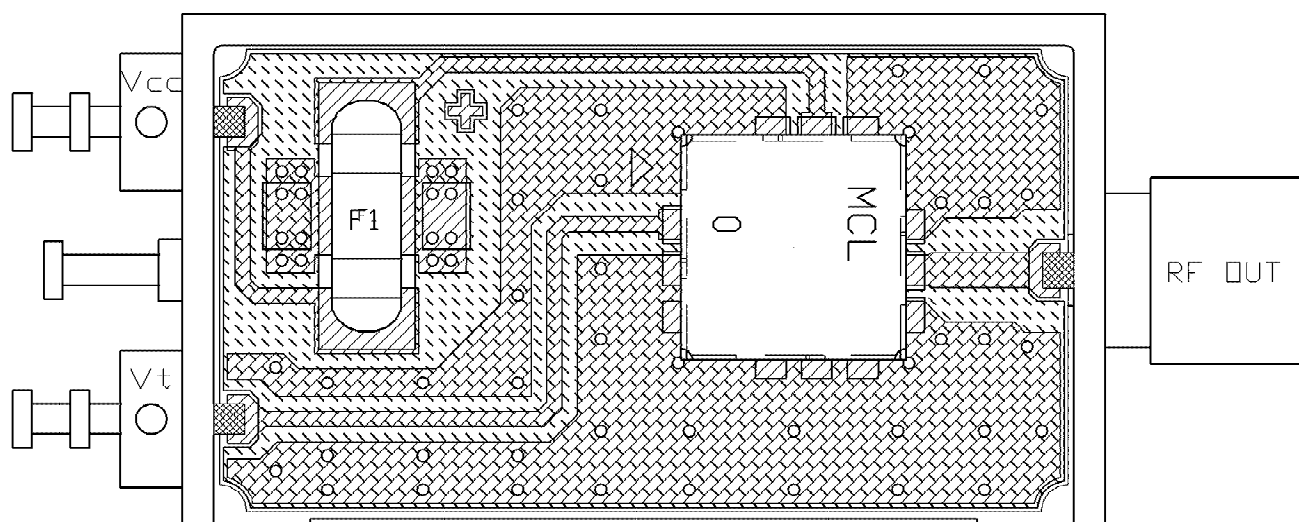
SCALE:

5:1

SHEET:

1 OF 1

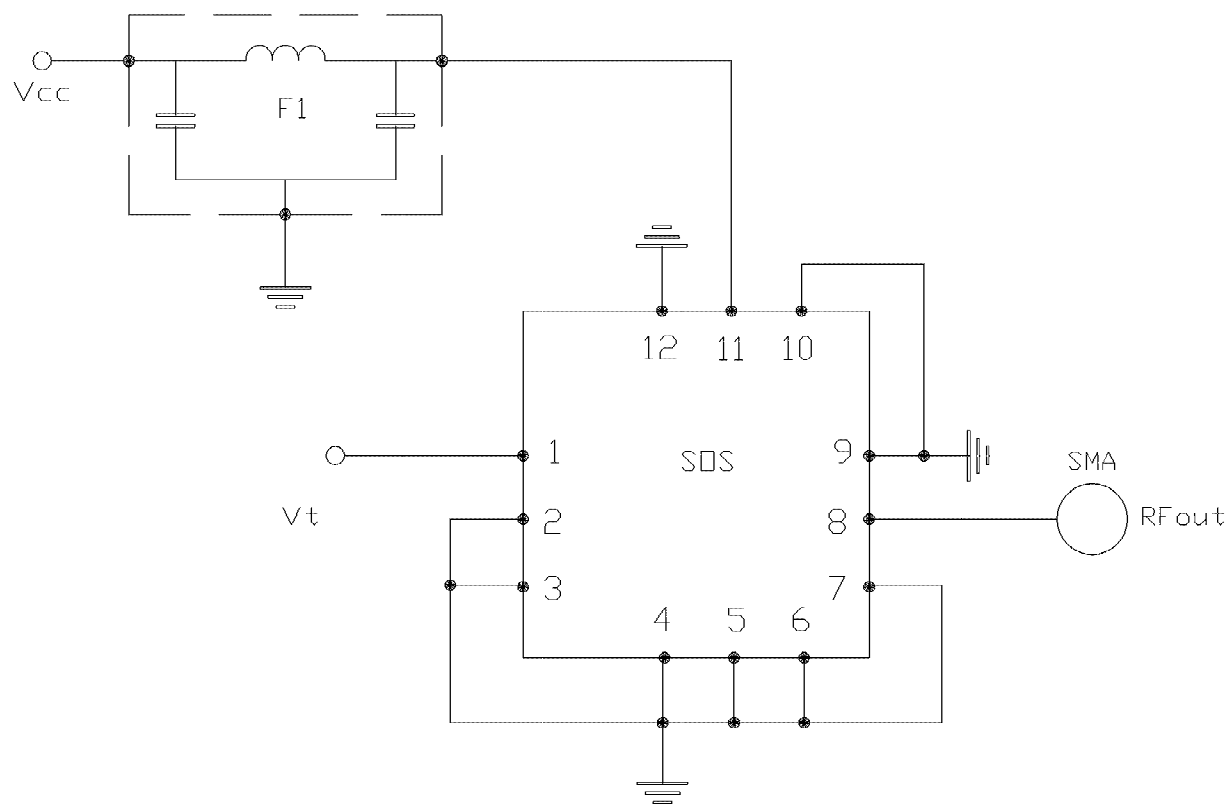
Evaluation Board and Circuit



TB-271

NOTES:

1. SMA FEMALE CONNECTORS.
2. PCB MATERIAL: RO4350B OR EQUIVALENT, DIALECTRIC CONSTANT=3.48,
DIALECTRIC THICKNESS=.020 INCH.



Schematic Diagram



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