Surface Mount

Voltage Controlled Oscillator

ROS-404-219+

5V Tuning for PLL IC's 375 to 410 MHz



CASE STYLE: CK605

Features
- linear tuning characteristics
- low phase noise
- low pushing
- low pulling
- aqueous washable

Applications
- wireless communication
- SMR repeater

+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 dBc/Hz SSB at offset frequencies,kHz Typ.				TUNING VOLTAGE RANGE (V)		SENSI-TIVITY (MHz/V)	PORT CAP (pF)	3 dB MODULATION BANDWIDTH (MHz)	NON HARMONIC SPURIOUS (dBc)	HARMONICS (dBc)		PULLING pk-pk @12 dBr (MHz)	PUSHING (MHz/V)	DC OPERATING POWER Vcc (volts)	DC OPERATING POWER Current (mA)
	Min.	Max.	Typ.	1	10	100	1000	Min.	Max.	Typ.	Typ.	Typ.	Typ.	Typ.	Max.	Typ.	Typ.		Max.
ROS-404-219+	375	410	+2	-87	-113	-133	-153	0.5	5	18	70	80	-90	-23	-15	0.1	0.5	5	25

Pin Connections

RF OUT	10
VCC	14
V-TUNE	2
GROUND	1,3,4,5,6,7,8,9,11,12,13,15,16

Maximum Ratings

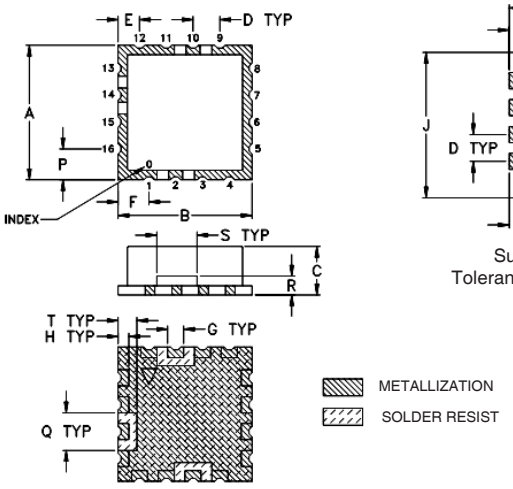
Operating Temperature	-55°C to 85°C
Storage Temperature	-55°C to 100°C
Absolute Max. Supply Voltage (Vcc)	7V
Absolute Max. Tuning Voltage (Vtune)	7V
All specifications	50 ohm system

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

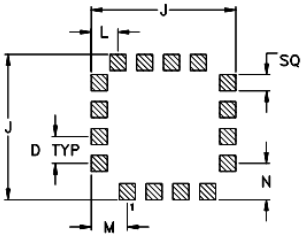
Tape & Reel: F37
7" Reels with 10, 20, 50, 100 devices
13" Reels with 200, 500 devices

Environmental Ratings: ENV65

Outline Drawing

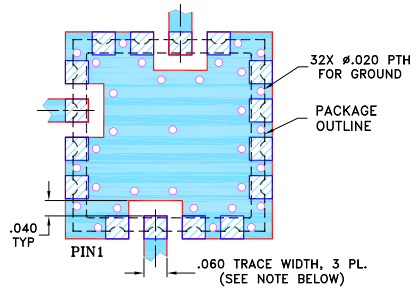


PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

Demo Board MCL P/N: TB-10
Suggested PCB Layout (PL-012)



NOTES:
1. TRACE WIDTH IS SHOWN FOR FR4 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 BOTTOM 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	S	T	wt.
.500	.500	.180	.100	.080	.115	.060	.040	.540	.060	.100	.135	.135	.115	.140	.070	.150	.070	grams
12.70	12.70	4.57	2.54	2.03	2.92	1.52	1.02	13.72	1.52	2.54	3.43	3.43	2.92	3.56	1.78	3.81	1.78	1.0

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.
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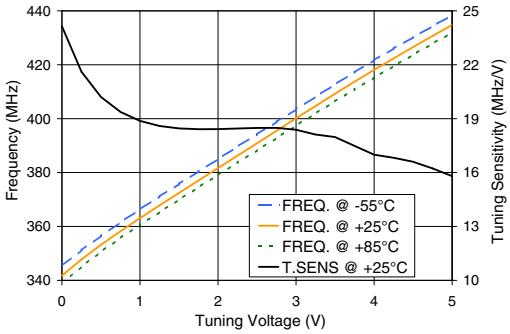
Performance Data & Curves*

ROS-404-219+

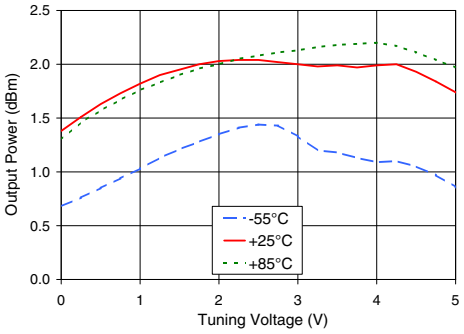
V TUNE	TUNE SENS (MHz/V)	FREQUENCY (MHz)			POWER OUTPUT (dBm)			Icc (mA)	HARMONICS (dBc)			FREQ. PUSH (MHz/V)	FREQ. PULL (MHz)	PHASE NOISE (dBc/Hz) at offsets				FREQ OFFSET (KHz)	PHASE NOISE at 393 MHz (dBc/Hz)
		-55°C	+25°C	+85°C	-55°C	+25°C	+85°C		F2	F3	F4			1kHz	10kHz	100kHz	1MHz		
0.00	24.14	345.4	341.7	338.8	0.68	1.38	1.30	19.82	-19.1	-46.7	-47.9	0.91	0.08	-85.6	-111.7	-131.8	-151.6	1.0	-88.37
0.50	20.21	356.5	353.2	350.6	0.85	1.63	1.57	19.90	-20.8	-45.6	-46.7	0.55	0.04	-87.5	-113.9	-133.9	-153.5	2.0	-94.72
0.75	19.37	361.5	358.2	355.7	0.94	1.73	1.67	19.93	-21.1	-45.3	-47.0	0.48	0.02	-89.6	-113.9	-134.4	-153.5	3.5	-102.25
1.00	18.88	366.4	363.1	360.6	1.03	1.82	1.76	19.96	-21.7	-44.2	-47.0	0.44	0.02	-87.3	-113.4	-134.6	-153.2	6.0	-108.99
1.25	18.59	371.1	367.8	365.3	1.13	1.90	1.83	19.97	-22.0	-44.7	-47.7	0.41	0.04	-87.6	-114.3	-134.7	-154.2	8.5	-110.80
1.50	18.46	375.8	372.4	370.0	1.21	1.95	1.90	19.99	-21.7	-45.2	-48.3	0.41	0.06	-88.4	-114.3	-134.5	-154.2	10.0	-113.29
1.75	18.41	380.4	377.1	374.5	1.28	2.00	1.96	20.00	-21.4	-44.6	-49.0	0.41	0.09	-87.9	-114.7	-134.7	-154.5	20.8	-119.82
2.00	18.42	385.0	381.7	379.1	1.35	2.03	2.00	20.00	-22.1	-44.2	-48.8	0.42	0.11	-88.6	-113.5	-134.3	-154.4	35.5	-124.08
2.25	18.45	389.6	386.3	383.7	1.41	2.04	2.05	20.01	-23.1	-43.8	-49.4	0.43	0.12	-88.2	-113.6	-134.3	-154.3	60.7	-129.98
2.50	18.48	394.2	390.9	388.3	1.44	2.04	2.08	20.01	-23.5	-42.6	-50.8	0.45	0.12	-89.8	-113.4	-134.1	-153.8	86.7	-132.49
2.75	18.49	398.8	395.5	392.8	1.43	2.02	2.11	20.02	-23.4	-41.6	-52.2	0.47	0.12	-88.2	-113.3	-134.0	-154.0	100.0	-133.26
3.00	18.38	403.5	400.1	397.4	1.33	2.00	2.13	20.03	-23.7	-40.8	-53.7	0.48	0.10	-87.9	-112.7	-133.6	-153.6	148.1	-137.19
3.25	18.12	408.1	404.7	401.9	1.20	1.98	2.16	20.05	-24.7	-40.2	-55.4	0.48	0.09	-89.1	-112.9	-133.7	-153.7	177.0	-138.65
3.50	17.98	412.7	409.3	406.4	1.18	1.99	2.18	20.06	-25.5	-41.0	-58.0	0.50	0.07	-87.5	-113.1	-133.4	-153.5	211.6	-140.43
3.75	17.48	417.2	413.7	410.9	1.13	1.97	2.19	20.07	-25.5	-40.5	-61.9	0.51	0.05	-88.2	-112.8	-133.2	-153.3	302.4	-143.49
4.00	17.00	421.7	418.1	415.2	1.09	1.99	2.20	20.07	-24.9	-40.5	-64.5	0.50	0.03	-87.5	-113.5	-133.2	-153.2	361.5	-144.86
4.25	16.82	426.0	422.4	419.5	1.10	2.00	2.17	20.03	-24.8	-42.5	-66.1	0.55	0.05	-88.6	-112.4	-133.2	-153.1	507.5	-148.06
4.50	16.60	430.2	426.6	423.7	1.05	1.93	2.11	20.00	-25.5	-43.4	-62.0	0.62	0.09	-89.1	-112.3	-133.0	-152.8	606.7	-149.40
4.75	16.23	434.3	430.7	427.9	0.97	1.84	2.04	19.98	-26.2	-42.4	-57.0	0.66	0.12	-89.2	-112.5	-133.0	-152.4	851.6	-152.61
5.00	15.80	438.4	434.8	431.9	0.86	1.74	1.97	19.97	-26.2	-41.2	-52.8	0.67	0.14	-87.1	-111.7	-132.6	-152.6	1000.0	-153.96

*at 25°C unless mentioned otherwise

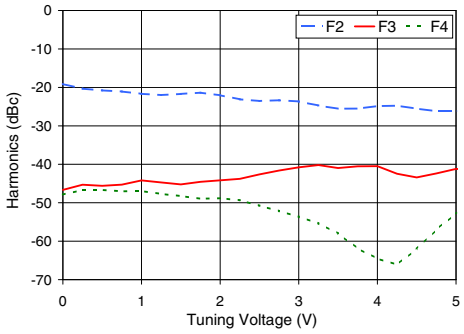
ROS-404-219+
Frequency and Tuning Sensitivity



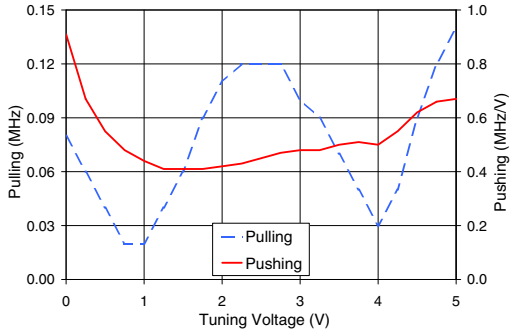
ROS-404-219+
Power Output



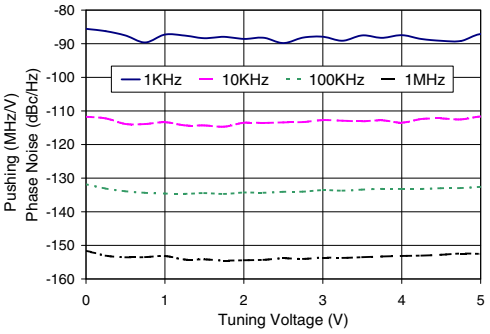
ROS-404-219+
Harmonics Level



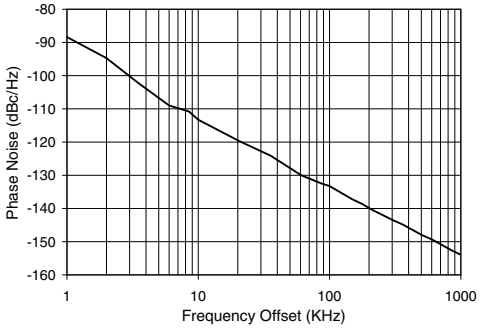
ROS-404-219+
Frequency Pulling & Pushing (Vcc ± 5%)



ROS-404-219+
Phase Noise Vs. Tuning Voltage



ROS-404-219+
Phase Noise



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Voltage Controlled Oscillator ROS-404-219+

Typical Performance Data

V TUNE	TUNE SENS (MHz/V)	FREQUENCY (MHz)			POWER OUTPUT (dBm)			HARMONICS (dBc)			FREQ. PUSH (MHz/V)
		-55ºC	+25ºC	+85ºC	-55ºC	+25ºC	+85ºC	F2	F3	F4	
0.00	24.14	345.4	341.7	338.8	0.68	1.38	1.30	-19.10	-46.66	-47.88	0.91
0.25	21.61	351.2	347.8	345.1	0.76	1.51	1.46	-20.33	-45.30	-46.70	0.67
0.50	20.21	356.5	353.2	350.6	0.85	1.63	1.57	-20.79	-45.60	-46.68	0.55
0.75	19.37	361.5	358.2	355.7	0.94	1.73	1.67	-21.06	-45.28	-47.01	0.48
1.00	18.88	366.4	363.1	360.6	1.03	1.82	1.76	-21.68	-44.18	-46.96	0.44
1.25	18.59	371.1	367.8	365.3	1.13	1.90	1.83	-21.99	-44.71	-47.69	0.41
1.50	18.46	375.8	372.4	370.0	1.21	1.95	1.90	-21.70	-45.22	-48.26	0.41
1.75	18.41	380.4	377.1	374.5	1.28	2.00	1.96	-21.37	-44.56	-48.96	0.41
2.00	18.42	385.0	381.7	379.1	1.35	2.03	2.00	-22.05	-44.16	-48.84	0.42
2.25	18.45	389.6	386.3	383.7	1.41	2.04	2.05	-23.11	-43.78	-49.35	0.43
2.50	18.48	394.2	390.9	388.3	1.44	2.04	2.08	-23.53	-42.61	-50.77	0.45
2.75	18.49	398.8	395.5	392.8	1.43	2.02	2.11	-23.35	-41.63	-52.15	0.47
3.00	18.38	403.5	400.1	397.4	1.33	2.00	2.13	-23.66	-40.78	-53.65	0.48
3.25	18.12	408.1	404.7	401.9	1.20	1.98	2.16	-24.72	-40.19	-55.36	0.48
3.50	17.98	412.7	409.2	406.4	1.18	1.99	2.18	-25.54	-40.96	-57.99	0.50
3.75	17.48	417.2	413.7	410.9	1.13	1.97	2.19	-25.51	-40.53	-61.90	0.51
4.00	16.99	421.7	418.1	415.2	1.09	1.99	2.20	-24.85	-40.49	-64.54	0.50
4.25	16.82	426.0	422.4	419.5	1.10	2.00	2.17	-24.75	-42.45	-66.09	0.55
4.50	16.60	430.2	426.6	423.7	1.05	1.93	2.11	-25.52	-43.42	-62.02	0.62
4.75	16.23	434.3	430.7	427.9	0.97	1.84	2.04	-26.20	-42.37	-56.99	0.66
5.00	15.80	438.4	434.8	431.9	0.86	1.74	1.97	-26.19	-41.19	-52.81	0.67
5.25	15.34	442.3	438.7	435.8	0.73	1.64	1.89	-25.79	-41.49	-50.73	0.66
5.50	14.89	446.2	442.6	439.6	0.59	1.53	1.81	-25.61	-41.60	-50.92	0.64
5.75	14.43	449.9	446.3	443.3	0.44	1.42	1.71	-26.19	-40.97	-50.68	0.62
6.00	13.98	453.5	449.9	446.9	0.29	1.30	1.62	-27.00	-40.92	-49.74	0.59
6.25	13.55	457.1	453.4	450.4	0.15	1.18	1.52	-27.51	-41.25	-47.75	0.56
6.50	13.14	460.5	456.8	453.7	0.00	1.05	1.41	-27.60	-41.02	-45.33	0.53
6.75	12.74	463.8	460.1	457.0	-0.14	0.93	1.30	-27.47	-40.14	-44.25	0.49
7.00	12.74	467.0	463.2	460.1	-0.29	0.81	1.19	-27.42	-39.40	-43.55	0.46

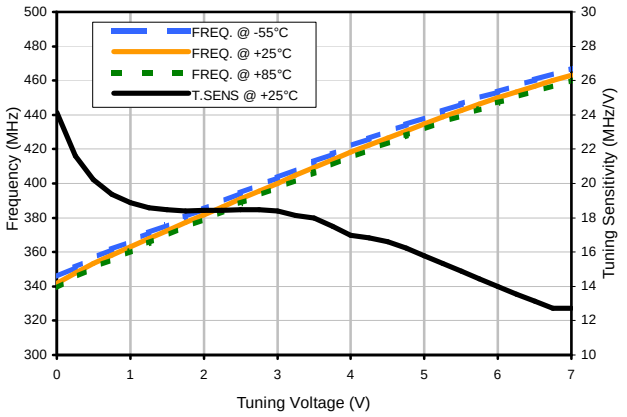
FREQ OFFSET (KHz)	PHASE NOISE (dBc/Hz)
1	-88
10	-113
100	-133
1000	-154

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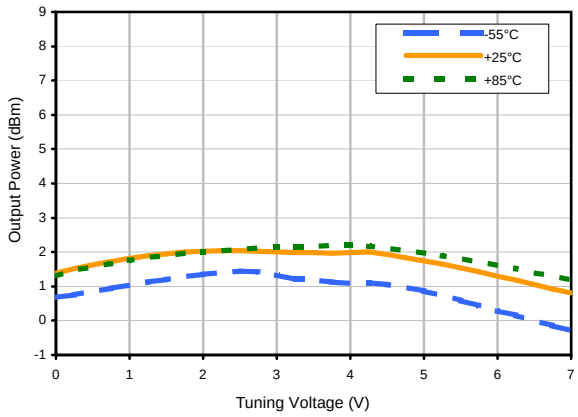
Voltage Controlled Oscillator ROS-404-219+

Typical Performance Data

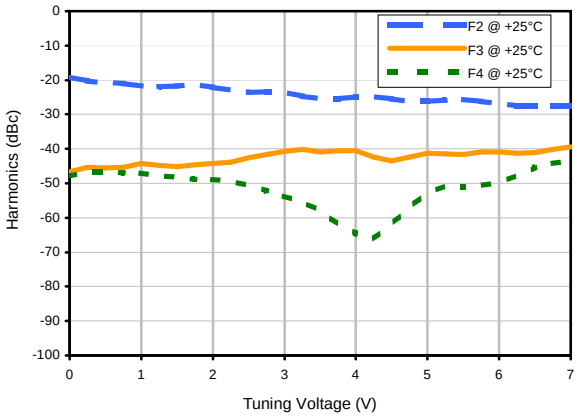
Frequency and Tuning Sensitivity



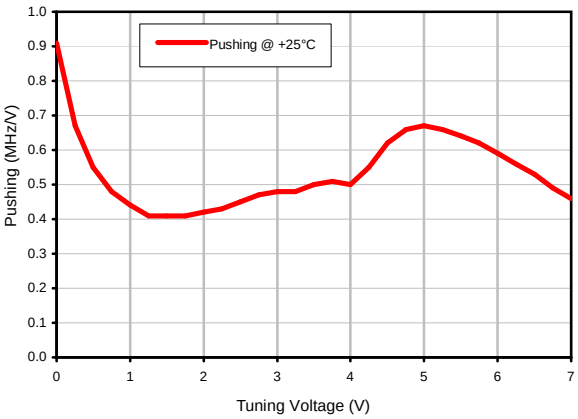
Power Output



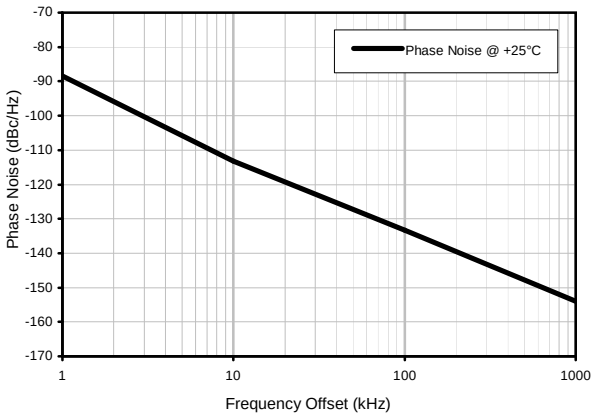
Harmonics Level



Frequency Pushing



Phase Noise

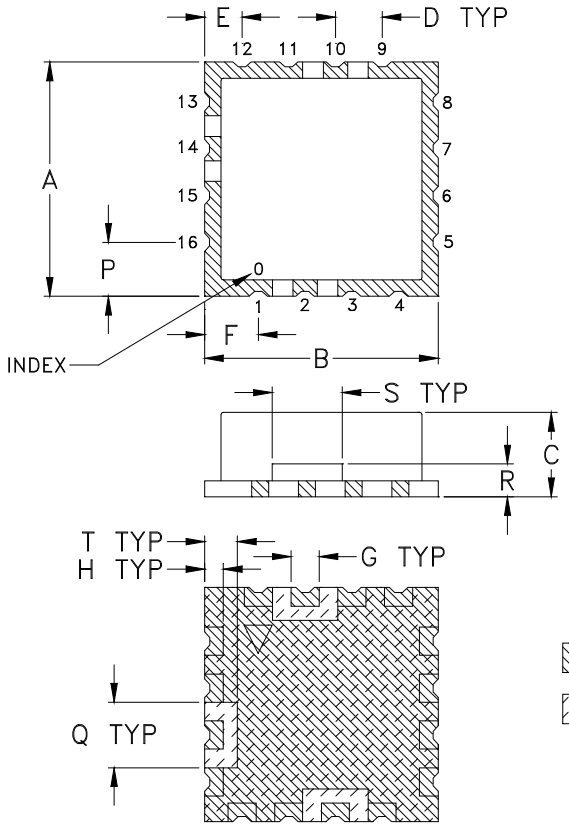


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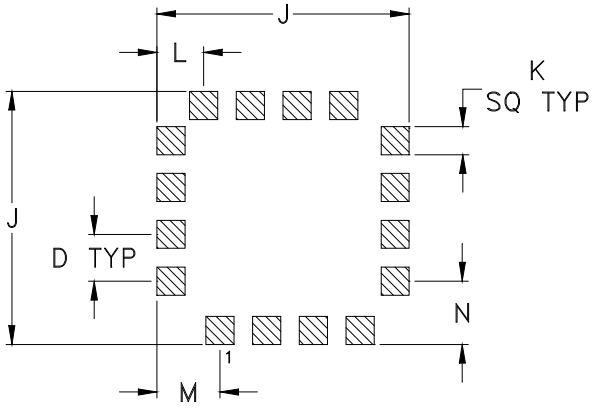
Case Style CK

CK605

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K
CK605	.500 (12.70)	.500 (12.70)	.180 (4.57)	.100 (2.54)	.080 (2.03)	.115 (2.92)	.060 (1.52)	.040 (1.02)	.540 (13.72)	.060 (1.52)

CASE #	L	M	N	P	Q	R	S	T	WT. GRAM	
CK605	.100 (2.54)	.135 (3.43)	.135 (3.43)	.115 (2.92)	.140 (3.56)	.070 (1.78)	.150 (3.81)	.070 (1.78)	1.2	+0.5 -0.0

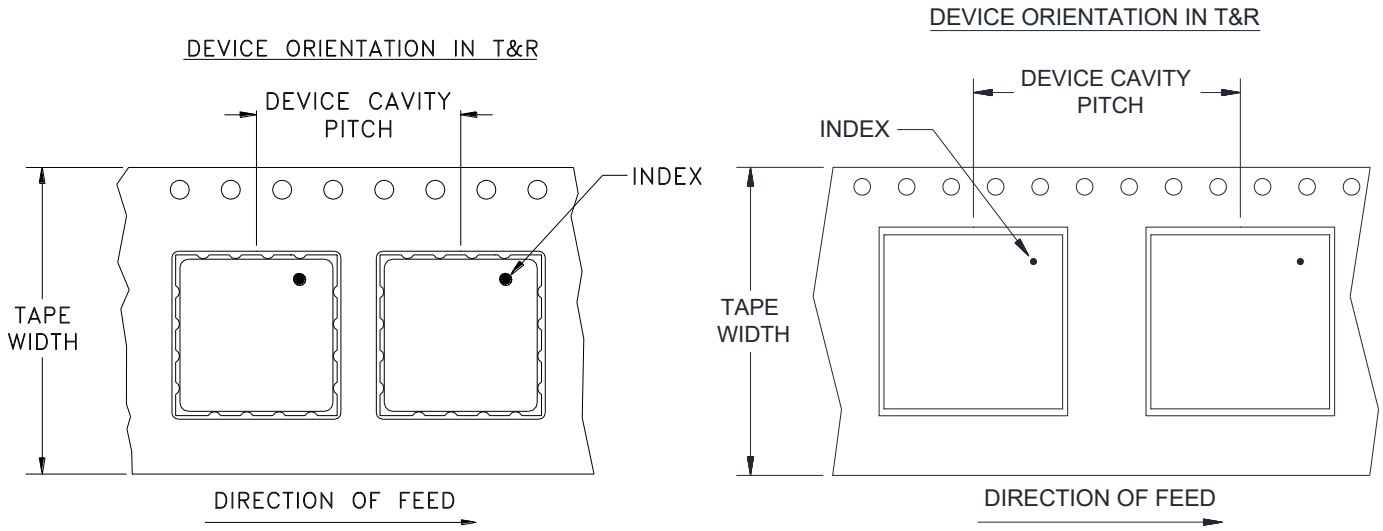
Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3Pl. ± .015

Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. 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. All models, (+) suffix.

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Tape & Reel Packaging TR-F37



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
24	16	7	Small quantity standards (see note)	10
				20
				50
				100
		13	Standard	200
				500

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

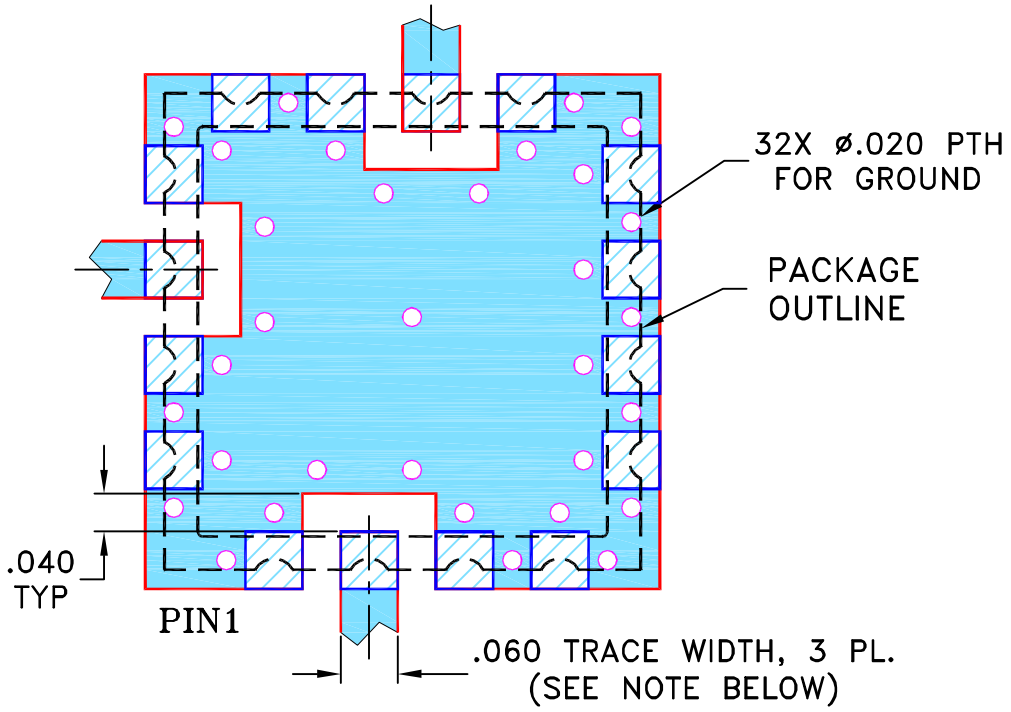
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THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
E	M105563	ADDED "rl" PIN CONNECTION	06/02/06	MMG	DJ
F	M105640	CORRECTED NOTE 2	06/08/06	MMG	MM
G	M124395	ADDED "RAMP"	09/09	EM	HH
G	R77589	ADDED "RAMP"	09/09	EM	HH

SUGGESTED MOUNTING CONFIGURATION FOR CK605 CASE STYLE, "kg/rl/16AM01" PIN CONNECTION



NOTES:

1. TRACE WIDTH IS SHOWN FOR FR4 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 BOTTOM 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	08/07/00
TOLERANCES ON:	CHECKED	SK	08/08/00
2 PL DECIMALS ±	APPROVED	DB	08/08/00
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

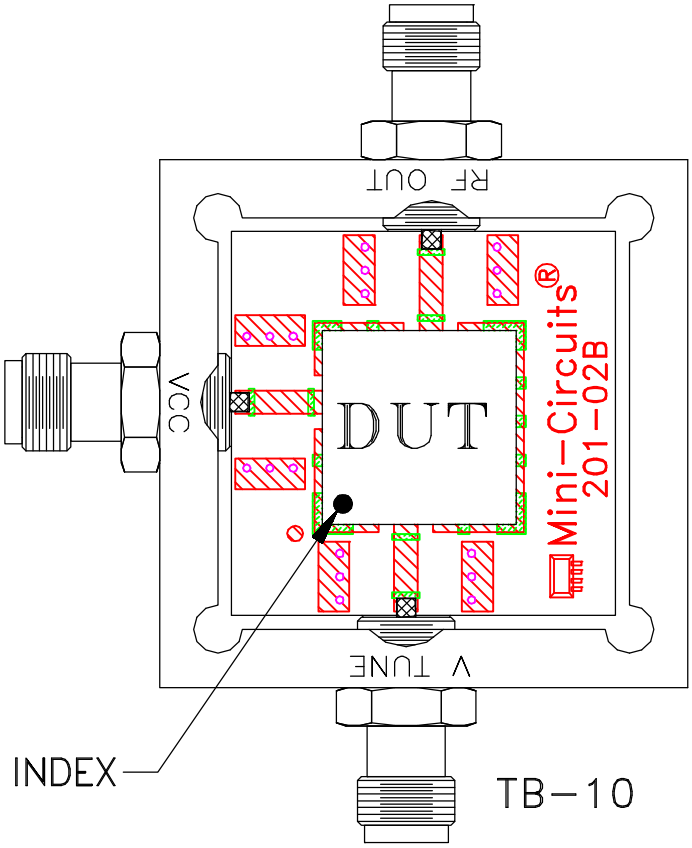
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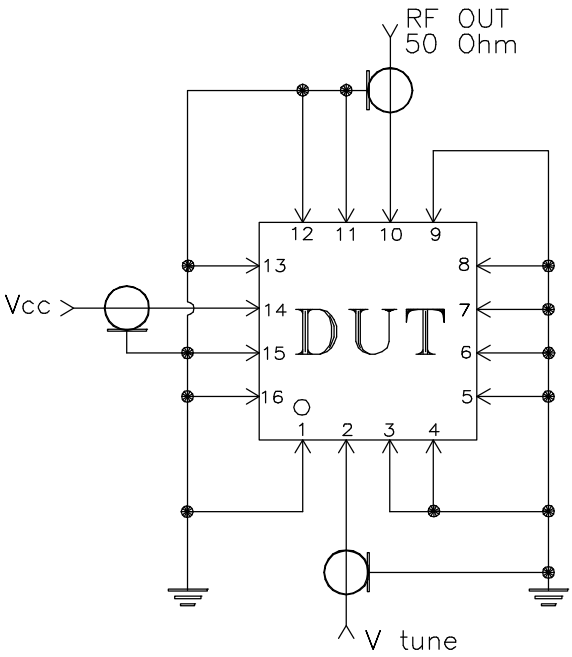
PL,kg/rl/16AM01,CK605,ROS/LAVI/RAMP

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-012	G

FILE:	SCALE:	SHEET:
98PL012	5:1	1 OF 1

Evaluation Board and Circuit





Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

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Environmental Specifications ENV65

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

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