Voltage Controlled Oscillator Product Guide

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Table of Contents

Company Profile

Z-Communications, Inc. is the largest domestic based manufacturer of Voltage Controlled Oscillators (VCOs) for the commercial/consumer electronics marketplace. Our low cost, high performance signal sources range in frequency from 20 MHz to 6000 MHz in a variety of innovative surface mount and leaded packages. Established in 1987, we have grown to become one of the leading global suppliers for the wireless telecommunications marketplace.

New product development is an area of focus that has set us apart as leaders in the VCO industry. Recently, we received a patent on a new ultra-low noise technology. We have also launched a new low power consumption line of VCOs using the same ultra low-noise technology.

Our products are geared to assist systems design engineers in implementing low cost, fast turnaround solutions for their most demanding communications applications. We feature numerous products aimed at the 900 and 2400 MHz ISM bands along with off the shelf products for CATV, commercial satellite communications, PCS/DECT/AMPS basestations, and other low cost markets. We also offer customized product development to meet your exact performance, packaing, and price needs without NREs.

We are the only domestic based VCO manufacturer capable of competing on worldwide markets so you can be assured that you will receive the best price/performance ratio anywhere! Complete in-house SMT lines and ATE ensure a reliable and repeatable product for your most exacting requirements. We also provide our products in tape/reel packaging for our higher volume customers for manufacturing ease.

We look forward to serving your VCO needs and want to demonstrate to you why VCOs are our business!

VCO Glossary

Charge Pump/Loop Filter	The circuitry in a phase-locked loop which integrates the output pulses from the phase detector into a dc voltage to drive the VCO to a specific frequency.
Coaxial Resonator	A metalized ceramic element used as the resonant component in a narrow-band tuning VCO.
Frequency Synthesizer	A method of utilizing a stable low frequency reference source to generate discrete frequencies. The synthesizer in this catalogue utilizes serial loading to achieve the desired output frequency.
Harmonic Suppression	The worst case amplitude of harmonically related signals relative to the fundamental frequency amplitude power. Harmonic Suppression is measured in decibels relative to the carrier (dBc).
Input Capacitance	The total equivalent capacitance at the input terminal of the tuning port of the VCO.
Phase Detector	The circuitry in a phase locked loop which compares the phase of the stable low frequency reference to the divided down frequency of the VCO.
Phase Locked Loop (PLL)	A method of referencing a high frequency VCO to a highly stable low frequency oscillator source in order to translate the reference stability to the high frequency output.
Phase Noise	The frequency instabilities of an oscillator output due to noise which modulates the carrier, either random or repetitive types of noise. Phase noise as specified in this catalogue is single sideband power relative to the power of the fundamental output frequency measured at various offset frequencies.
Pulling	The change in oscillator output frequency due to output load impedance mismatch. Pulling is measured in MHz with respect to a 12dB return loss, equivalent to a 1.67:1 VSWR.

VCO Glossary

Pushing	The change in oscillator output frequency as a result of a change in the oscillator supply voltage. Pushing is expressing in MHz/V.
Serial Loading	A method of programming data into a synthesizer whereby programming information is loaded sequentially over one data input line.
Spurious	The total amount of power of the undesired frequencies produced by a fundamental oscillator not related to an integral multiple of the output frequency (i.e., harmonics).
Stability	A measure of how far a specific frequency shifts as a result of temperature and aging effects. Stability is usually expressed in parts per million (PPM) or kHz/°C.
Step Size	The discrete spacing between frequencies selected in a programmable frequency symthesizer.
Switching Speed	The time it takes a phase locked loop to settle within ten rad/sec of its final frequency upon a new frequency command.
Tuning Sensitivity	The ratio of VCO frequency change to a change in tuning voltage, expressed in MHz/V; also referred to as K_{vco}, i.e. VCO gain.
Voltage Controlled Oscillator	A device which produces an output frequency which is continuously tuned by the application of a control voltage.
Voltage Standing Wave Ratio (VSWR)	The ratio of the maximum voltage to minimum voltage on a transmission line due to reflections from an unmatched source and load impedance.

Part Number	Max. Start Frequency (MHz) 1	Min. Stop Frequency (MHz) 1	Tuning Voltage (Vdc)	Tuning Sensitivity (MHz/V) 2	Phase Noise @10 kHz (dBc/Hz) 3	Phase Noise @1 kHz (dBc/Hz) 3	Output Power (dBm) 4	Harmonic Suppression (dBc) 5	Pulling 1.7:1 VSWR (MHz) 6	Pushing (MHz/V) 7	Input Capacitance (pF, max.) 8	Supply Voltage (Vdc, nom.) 9	Supply Current (mA, typ.) 10	Package Style	Operating Temperature (° C) 11
V040ME01	38	41	0-5	1	-108	-89	3.5±3.5	-4	<1	<1	1000	5	18	MINI-14H	-30 to 85
V044ME01	42	46	0.5-4.5	3	-118	-97	-1±1	-13	<1	<1	500	5	8	MINI-14S	-30 to 85
V061ME01	45	77	1-10	4	-118	-97	4±4	-4	<1	<2	500	5	21	MINI-14S	-30 to 85
V049MC01	49	50	0-5	1	-110	-90	-7.5±2.5	-5	<2	<1	1000	5	7	MINI-14H	0 to 70
V060SE01	71	102	0-15	5	-113	-95	10±2	-5	<3	<1	50	15	24	S	-20 to 70
V110SC01	85	145	0-12	7	-103	-82	5±3	-10	<2	<1	50	12	14	S	0 to 70
V140MC10	104	176	1-9.5	12	-105	-84	2.75±3.75	-5	<2	<2	50	10	30	MINI-14S	0 to 70
V116MC01	114	118	2-4	12	-117	-94	0±3	-7	<1	<1	200	5	13	MINI-14S	0 to 70
V110SLE5	118	125	0-5	5	-95	-75	5±5	-10	<7	<2	50	5	15	MINI-14H	-40 to 85
SMV0135A	120	150	0.5-4.5	12	-101	-79	3±3	-11	<2	<2	50	5	20	SUB-L	-30 to 85
V110S015	120	190	0-15	5	-105	-85	10±2	-8	<6	<1	50	15	28	S	0 to 70
SMV0128A	126	130	0.7-4.3	12	-102	-82	3±3	-10	<1	<1	500	5	22	SUB-L	-30 to 85
V131MC01	130	132	1-9	1	-114	-102	9±2	-10	<1	<1	200	12	33	MINI-14H	0 to 70
V136ML02	136	143	3-12	3	-100	-80	9.5±2.5	-15	<9	<1	50	12	20	MINI-14H	-55 to 85
V180MC10	144	216	1-9.5	12	-100	-80	2.5±3.5	-6	<2	<2	50	10	33	MINI-14S	0 to 70
V180ME01	145	215	1-9.5	13	-108	-84	4±4	-5	<2	<5	100	5	20	MINI-14S	-40 to 85
V150S015	150	230	0-11	8	-102	-81	11±3	-5	<10	<2	50	15	36	S	0 to 70
V165ME01	150	180	0-4	14	-109	-87	2±3	-15	<1	<2	<500	3.5	9	MINI-14S	-40 to 85
V180S010	180	260	0-11	10	-102	-80	7.5±2	-3	<25	<2	50	12	18	S	0 to 70
V190ME02	188	192	2-9	3	-114	-92	8±2	-15	<2	<1	75	9	25	MINI-14H	-40 to 85
V200ME01	195	305	0-15	8	-100	-74	11±3	-5	<15	<1	50	15	21	MINI-14H	-30 to 85
V200ME02	198	200	0-9	3	-110	-95	9±2	-10	<5	<1	50	9	31	MINI-14H	-40 to 85
V200S015	200	300	0-15	9	-100	-78	11±2	-5	<10	<1	50	15	35	S	0 to 70
V240ME02	200	280	1-8	14	-107	-88	4±3	-10	<2	<2	200	9	25	MINI-14S	-40 to 85
V200ML01	200	300	0-15	8	-100	-78	11±2	-10	<16	<1	50	15	26	MINI-14H	0 to 70
V240ME01	210	270	0.5-4.5	25	-105	-83	1.5±2.5	-10	<5	<5	100	5	19	MINI-14S	-40 to 85
V200MLE1	230	255	0-5	10	-95	-75	6±3	-5	<5	<5	100	5	13	MINI-14H	-40 to 85
V200MC01	240	260	0-10	6	-110	-85	5.5±2.5	-15	<25	<5	50	12	39	MINI-14H	0 to 70
V243MC01	243	244	0.5-7.5	4	-102	-85	3±3	-15	<2	<3	200	5	23	MINI-14H	0 to 70
V250ML01	250	350	0-15	14	-100	-78	11±2	-10	<13	<1.5	50	15	30	MINI-14H	-5 to 75
V250S015	250	350	0-15	14	-95	-75	10±2	-5	<30	<1	50	15	31	S	0 to 70
V285ME01	270	300	0.5-4.5	15	-98	-77	5.25±1.75	-5	<2	<6	250	5	22	MINI-14H	-40 to 85
V305ME01	290	320	0.5-4.5	14	-96	-79	5±2	-6	<15	<2	500	5	13	MINI-14H	-40 to 85
V300ME01	300	400	0-15	15	-96	-76	11±2.5	-5	<20	<1	470	15	30	MINI-14H	-35 to 85
V300ML01	300	400	0-15	12	-95	-72	10±2	-5	<25	<1	50	15	30	MINI-14H	0 to 70
V300S015	300	400	0-15	9	-95	-74	10±2	-5	<17	<1	50	15	31	S	0 to 70
V330ME01	320	340	1-4	15	-99	-78	5±2	-5	<11	<5	250	5	13	MINI-14H-L	-30 to 70
V351S015	340	465	0-15	18	-100	-80	10±3	-5	<20	<5	50	15	31	S	0 to 70
V350ML01	350	450	0-15	9	-95	-77	10±2	-8	<1	<45	470	15	27	MINI-14H	0 to 70
V350S015	350	450	0-15	17	-102	-80	9±4	-10	<20	<5	50	15	44	S	0 to 70
V385ME01	360	410	0.5-5	39	-109	-85	7.25±2.75	-3	<2	<3	300	5	15	MINI-14S	-30 to 85
V440MC01	370	515	0-8	40	-107	-79	10±4	-4	<1	<2	200	10	16	MINI-14S	0 to 70
V440MC02	370	460	0.5-4.5	37	-107	-83	7.25±2.75	-3	<1	<2	250	5	14	MINI-14S	-40 to 85
V440ME01	375	420	0.5-4.5	27	-108	-84	8.25±1.75	-4	<1	<2	250	5	15	MINI-14S	-40 to 85
V400ML01	400	500	0-15	11	-95	-70	10±3	-6	<50	<1	50	15	26	MINI-14H	0 to 70
V400S015	400	500	0-15	15	-90	-70	12±2	-5	<35	<2	50	15	26	S	0 to 70
V560MC10	400	720	0-8	50	-104	-82	7±6	-5	<2	<1	200	10	18	MINI-14S	0 to 70
V560MC03	400	800	0-12	47	-104	-81	6.5±5.5	-3	<2	<6	200	5	17	MINI-14S	-10 to 70
V418MEM1	403	433	0.5-4.5	12	-114	-84	0±3	-12	<5	<5	150	5	13	MINI-16M-LOW	-40 to 85
V550ML01	430	610	0-8	27	-95	-72	12±3	-10	<25	<5	50	8	34	MINI-14H	0 to 85
V450ML01	450	550	0-15	12	-98	-75	11±2	-10	<50	<1	50	15	27	MINI-14H	0 to 70
V450S015	450	550	0-15	10	-93	-71	11±2	-10	<60	<1	50	15	30	S	0 to 70
V637MC01	465	810	0.5-8	54	-103	-80	8.5±4.5	-5	<5	<2	100	12	22	MINI-14S	0 to 70
V637MC02	465	810	0.5-8	56	-106	-84	8.5±5.5	-5	<3	<2	150	12	25	MINI-14S-L	0 to 70
V560ME04	470	490	0.5-3.5	58	-107	-84	5±2	-5	<1	<2	100	5	13	MINI-14S-L	-30 to 85
V500ML01	500	600	0-15	12	-90	-66	11±2	-7	<40	<3	50	15	25	MINI-14H	0 to 70
V707S001	500	1000	0-20	29	-95	-75	14±3	-8	<45	<2	50	12	37	S	0 to 70
V515ME01	502	529	0.5-4.5	10	-116	-84	0±3	-10	<5	<5	150	5	11	MINI-16M-LOW	-40 to 85
V638ME01	510	770	1-8	51	-103	-80	4.5±4.5	-5	<5	<5	100	9	14	MINI-14S	-30 to 85
SMV0550L	559	561	0.5-3.5	30	-94	-74	-4±2	-15	<2	<3	50	4	15	SUB-L	-40 to 85

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V600ML03	560	690	1.5-13.5	17	-95	-70	10±3	-10	<33	<1	50	15	27	MINI-14H	-5 to 75
CLV0625E	575	675	0.5-4.5	43	-110	-85	5.5±2.5	-8	<5	<5	150	5	26	MINI-14S	-40 to 85
V706SE01	600	1200	0.5-24	29	-96	-73	11±3	-5	<30	<5	100	12	36	S	-30 to 70
V600ML01	600	700	0-15	13	-90	-66	15±3	-10	<61	<1	50	15	30	MINI-14H	0 to 70
V706S001	600	1200	.5-24	35	-95	-75	11±3	-10	<30	<8	50	12	37	S	0 to 70
V706MC02	600	1200	0-13	60	-100	-77	5.5±4.5	-5	<10	<5	150	10	18	MINI-14H	0 to 70
V708ME01	640	945	0-9	49	-93	-73	9±4	-5	<10	<5	50	9	17	MINI-14S	-40 to 85
V700SC01	650	1300	0-15	50	-100	-80	9±2	-5	<5	<1	90	12	43	S	0 to 70
V700SC02	660	1360	0-17	54	-100	-78	9±2	-5	<5	<1	90	12	45	S	0 to 70
V504MC03	670	690	0-5	25	-98	-75	8±2.5	-7	<10	<3	50	9	22	MINI-16	0 to 70
V580ME08	680	820	1-8	33	-103	-78	12.5±3.5	-5	<10	<2	50	8.4	30	MINI-14S	-30 to 75
V700ME02	690	710	1-4	20	-99	-76	5±2	-5	<29	<3	250	5	13	MINI-14H-L	-30 to 70
V502BMS1	700	1200	1.5-13	60	-103	-79	9.5±3	-5	<10	<1	50	15	25	MINI-14H	0 to 70
V504MC02	700	800	1-11	16	-103	-78	13±2	-6	<16	<2	50	12	31	MINI-16	0 to 70
V502BMS3	700	1400	1.5-17	58	-99	-75	6.75±2.75	-7	<15	<5	100	10	19	MINI-14H	0 to 70
D704ME01	692	716	1-4	15	-106	-83	3±2	-10	<1	<1	50	5	8	MINI-14S-LOW	-30 to 70
V504ME02	710	870	2-16	18	-98	-75	6.5±3.5	-6	<7	<2	50	9	24	MINI-16	-30 to 85
V778ME01	713	748	1-4	29	-95	-74	6±2.5	-5	<10	<5	100	5	19	MINI-16	-40 to 85
CLV0798A	730	920	1-15	28	-112	-89	1.25±3.25	-12	<2	<2	100	5	19	MINI-16	-40 to 75
CLV0769E	734	804	1-4	40	-112	-89	2.5±2.5	-9	<2	<5	100	5	20	MINI-16	-40 to 85
V700ME04	740	750	1-4	23	-103	-81	4.5±2	-8	<10	<5	50	5	17	MINI-16-L	-30 to 70
V502MC03	750	850	1-8	44	-97	-74	5±2.5	-6	<6	<5	50	5	23	MINI-14S	-40 to 70
V700S004	750	1350	0-18	40	-100	-78	14±2	-10	<26	<6	100	12	36	S	0 to 70
V700ME01	765	815	0.5-4.5	40	-95	-70	4.5±2	-10	<18	<2	50	4.5	15	MINI-14H	-40 to 70
V700ME03	770	830	0.5-4.5	31	-90	-68	11±2	-10	<27	<2	50	12	32	MINI-14H	-40 to 70
D796ME01	782	810	1-4	17	-106	-80	3±2	-10	<1	<1	50	5	9	MINI-14S-LOW	-30 to 70
CLV0795E	797	803	1-4	17	-112	-90	-6.5±1.5	-35	<1	<1	100	5	10	MINI-14S	-30 to 85
D807ME01	800	815	1-4	17	-108	-84	2.25±2.25	-10	<1	<1	50	5	10	MINI-14S	-30 to 70
D815ME01	800	830	1-4	22	-107	-82	3.5±1.5	-10	<1	<1	50	5	10	MINI-14S-LOW	-30 to 70
V580ME03	800	890	1-8	26	-110	-87	-4±3	-30	<5	<2	100	5	19	MINI-14S	-40 to 85
V585ME30	800	1600	1-21	60	-101	-77	8±3	-5	<20	<2	100	11.5	16	MINI-14S	-40 to 85
V585ME40	800	1650	1-21	54	-100	-74	5.5±3.5	-5	<15	<5	100	5	16	MINI-14S-LOW	-40 to 85
V580ME09	805	825	0.5-4.5	43	-110	-87	5.5±2	-12	<5	<5	120	5	18	MINI-16-L	-30 to 85
CLV0815E	806	824	0.5-4.5	11	-113	-91	-5±2	-35	<2	<2	100	5	11	MINI-14MS	-30 to 85
D850ME01	837	863	0.75-4.25	16	-107	-83	2.5±2.5	-12	<2	<1	100	5	8	MINI-14S	-30 to 85
D850ME02	837	863	0.75-4.25	16	-100	-80	2.5±2.5	-10	<1	<1	<100	5	10	MINI-14S-L	0 to 85
V580MC04	850	890	0-5	40	-99	-75	8±2	-5	<5	<3	50	5	24	MINI-16	0 to 70
CLV0868E	850	896	0.5-4.5	25	-116	-89	-1±2	-20	<2	<2	150	5	21	MINI-14S	-40 to 85
V580MC05	850	925	1-8	19	-99	-78	13±3	-3	<12	<1	50	10	40	MINI-16	-10 to 70
V580MC08	850	910	0.5-4.5	42	-100	-76	-3±3	-5	<1	<1	50	12	23	MINI-16	-40 to 70
V50BXSC3	860	1500	0-11	65	-97	-73	7±4	-6	<30	<2	50	12	23	S	0 to 70
V582ME02	860	910	0.75-4.25	50	-100	-76	2.5±2.5	-13	<6	<2	100	5	18	MINI-16	0 to 85
V583SE01	860	1240	0.5-11	64	-102	-81	8.5±3	-4	<20	<3	50	12	19	S	0 to 80
CLV1025E	865	1180	1-14	28	-112	-87	4±4	-12	<5	<5	100	5	23	MINI-14S	-40 to 85
V506MC01	880	1020	1-8	33	-94	-70	12±2	-10	<15	<1	50	8.4	28	MINI-14H	-30 to 70
CLV0905E	896	914	0.5-4.5	16	-115	-90	-5±2	-25	<2	<2	120	5	11	MINI-14S	-30 to 85
V50BXS04	900	1900	0-20	72	-95	-70	12±4	-10	<25	<1	50	12	34	S	0 to 70
V580MC01	900	960	1-4	40	-95	-75	6±2	-20	<8	<2	40	5	20	MINI-14H	0 to 70
V580MC06	900	960	1-4	43	-100	-75	6±3	-10	<10	<3	50	5	17	MINI-16-L	0 to 70
V580ME02	900	960	1-4	37	-110	-85	5.5±2.5	-15	<5	<2	100	5	19	MINI-14S	-40 to 85
CLV1000E	900	1100	1-10	27	-111	-89	4.5±2.5	-14	<2	<2	100	5	22	MINI-14S	-40 to 85
V583ME01	900	1200	1-8	60	-100	-78	11±2	-10	<12	<3	50	5	25	MINI-14H	-40 to 85
LPV915A1	902	928	0-3	30	-108	-85	-3.75±2.75	-9	<1	<10	100	1.2	12	MINI-14S-LOW	-40 to 85
D915ME01	902	928	0-3	13	-100	-76	0±2	-20	<1	<1	50	3	8	MINI-14H	-30 to 80
D915ME02	902	928	0.5-4.5	12	-103	-78	2.5±2.5	-15	<1	<1	50	5	9	MINI-14H	-40 to 85
V580ME04	910	1000	1-8	22	-110	-88	3.25±2.25	-17	<2	<2	100	5	20	MINI-14S	-40 to 85
V50BS009	920	1455	0-12	45	-95	-70	13±3	-10	<25	<1	50	12	35	S	-40 to 85
V585ME20	925	1650	3-21	57	-102	-78	7±2.5	-8	<20	<2	100	11.5	16	MINI-14S	-40 to 85
CLV0945E	936	953	0.5-4.5	33	-114	-89	3±2	-19	<5	<5	100	5	20	MINI-14S	-40 to 85
V585ME08	950	1900	0-12	91	-99	-75	5.5±2.5	-8	<15	<5	150	10	15	MINI-14S	-30 to 80

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V580MC02	951	977	0-5	16	-102	-80	-3±2	-8	<1	<2	50	5	16	MINI-16	0 to 70
V581ME01	951	977	0-5	19	-103	-80	7±2	-5	<10	<5	50	5	15	MINI-16	-40 to 85
CLV0980E	973	986	0.5-4.5	16	-117	-93	1±2	-20	<1	<1	150	5	22	MINI-14S	-40 to 85
V581ME04	974	976	1.3-3.8	15	-105	-83	4.5±2	-11	<5	<2	50	10	18	MINI-16	0 to 80
V583ME02	985	1060	1-4	75	-90	-73	6.5±2.5	-6	<8	<3	50	5	15	MINI-14H	-40 to 85
V585ME16	1000	2000	1-20	66	-96	-72	5.5±2.5	-5	<15	<5	100	10	15	MINI-14S	-40 to 80
V583TE08	1012	1040	0.5-4.5	26	-107	-83	-2±2	-35	<5	<2	100	5	20	375	-30 to 85
CLV1052M	1048	1058	0.5-4.5	19	-112	-89	1.5±2.5	-45	<5	<2	50	5	20	MINI-14MS-L	-30 to 85
V582ME03	1060	1100	0.5-5.5	38	-104	-80	11±2	-10	<12	<5	50	5	34	MINI-16	-40 to 85
V582ME07	1061	1062	1.5-4.0	12	-116	-92	0±3	-28	<2	<1	100	10	16	MINI-14MS	0 to 80
V582ME06	1061	1063	1.5-4.0	20	-111	-86	2±3	-30	<2.5	<1.5	100	5	22	MINI-14MS	0 to 80
V508ME01	1100	1160	1-11	30	-100	-78	11±3	-6	<8	<2	50	12	30	MINI-16	-40 to 80
CLV1137A	1100	1175	0.5-4.5	37	-111	-86	1.5±2.5	-19	<5	<5	100	5	20	MINI-14S	-40 to 85
V585ME11	1100	1500	0.8-20	40	-102	-77	6±2	-10	<15	<5	100	10	16	MINI-14S	0 to 80
V585ME05	1100	1900	0.8-20	65	-102	-74	6.5±2.5	-13	<10	<10	100	10	25	MINI-14S	0 to 80
V585ME07	1100	2100	1-20	67	-98	-73	5.5±2.5	-5	<15	<5	100	10	15	MINI-14S-LOW	-40 to 80
V602ME06	1145	1245	0.3-3.0	92	-101	-76	6.5±2.5	-15	<15	<5	50	3.3	15	MINI-14S-LOW	-20 to 70
V503MC10	1150	1520	1-11	65	-99	-71	8.75±3.25	-5	<6	<2	50	12	26	MINI-16	0 to 70
V585ME01	1190	1610	0.5-8.5	66	-101	-73	10±2.5	-2	<10	<5	50	10	25	MINI-14S	0 to 80
V585SE01	1190	1610	0.5-11	68	-98	-74	5.75±3.75	-8	<30	<5	50	12	15	S	0 to 80
V585ME04	1190	1610	0.5-8.5	65	-100	-73	7±2.5	-2	<15	<5	50	5	18	MINI-14S	-40 to 85
V602ME04	1240	1593	0-10	61	-98	-72	6.5±2	-10	<15	<5	50	3.5	17	MINI-14S	-40 to 85
V607TE01	1279	1313	0.4-2.8	42	-99	-77	-3.5±2.5	-30	<5	<2	50	3	6	375	-25 to 75
CLV1320E	1295	1335	1-5	18	-113	-89	-2.5±3.5	-30	<2	<1	50	5	27	MINI-14S	-40 to 85
V600SC01	1300	2300	0-25	60	-95	-74	12±3	-10	<40	<10	50	15	20	S	-10 to 80
V584ME01	1305	1595	1.5-10.5	43	-99	-74	10±2.5	-10	<17	<2	50	12	24	MINI-14H	-40 to 70
V584ME02	1305	1595	2-9.5	48	-103	-77	10.5±2.5	-10	<12	<2	50	12	26	MINI-14S	-40 to 70
V586ME01	1330	1680	2-10	60±15	-101	-73	11±2	-5	<10	<2	35	12	27	MINI-14S	0 to 70
V584ME08	1340	1735	1-14	51	-103	-75	10±2	-10	<15	<5	50	12	24	MINI-14S	-40 to 70
CLV1360E	1345	1375	0.5-4.5	19	-110	-88	-3±3	-15	<2.5	<2.5	100	5	21	MINI-14S	-40 to 85
V582SC01	1350	1500	0-12	25	-100	-75	15±2	-10	<16	<1	50	12	36	S	0 to 70
V582SC02	1350	1580	0-20	20	-105	-78	12±2	-10	<17	<2	50	10	29	S	0 to 70
CLV1385E	1370	1400	0.5-4.5	18	-110	-88	0±3	-20	<2	<2	100	5	20	MINI-14S	-40 to 85
V562ME01	1375	1750	7.5-19.5	62	-96	-70	9.5±3.5	-20	<9	<5	50	12	30	MINI-16	-30 to 75
V603ME05	1400	1650	2-18	28	-100	-78	7±3	-7	<20	<10	50	5	17	MINI-14S	-40 to 85
V607TE02	1404	1439	0.4-2.8	48	-100	-77	-2±2.5	-19	<5	<5	50	3	9	375	-25 to 75
CLV1425E	1410	1440	1-5	15	-112	-89	-1.5±3	-30	<2	<1	50	5	28	MINI-14S	-40 to 85
V586ME04	1430	2010	2-14	68	-100	-73	6±3	-5	<15	<5	50	12	18	MINI-14S	0 to 70
V602ME07	1440	1670	0.25-4.75	99	-101	-73	4±2	-13	<15	<5	50	4.5	12	MINI-14S	-40 to 85
CLV1455E	1440	1470	1-5	16	-109	-82	-2.5±4	-35	<2	<1	50	5	28	MINI-14S	-40 to 85
V616ME02	1445	1880	0.8-7.4	109	-95	-67	4.75±2.75	-7	<5	<5	50	10	18	MINI-16	0 to 80
V602ME03	1470	1670	2-20	24	-101	-74	12.5±3.5	-20	<40	<8	30	9	18	MINI-14S	-30 to 75
V500SE01	1480	1514	3-10	24	-95	-73	11±2	-10	<50	<5	50	12	27	S	-25 to 70
V603MC02	1480	1980	1-11	105	-93	-70	17±2	-10	<58	<3	50	10	36	MINI-14H	0 to 40
CLV1550E	1500	1600	0.5-5	44	-106	-82	0±3	-35	<5	<5	50	5	22	MINI-14MS	-40 to 85
CLV1525E	1500	1550	0.3-4.7	25	-110	-86	0.5±2.5	-20	<5	<5	100	5	27	MINI-14S	-40 to 85
V585ME14	1470	1875	0.8-20	35	-102	-79	5±3	-10	<15	<5	100	10	15	MINI-14S	0 to 80
V585ME12	1500	1900	0.8-20	35	-102	-79	5±3	-10	<15	<5	100	10	15	MINI-14S	0 to 80
V603ME04	1510	1650	1.5-12	24	-105	-82	0±3	-7	<5	<4	100	8	14	MINI-14S	-10 to 85
CLV1535E	1520	1550	0.5-4.5	15	-110	-88	0.5±2.5	-30	<3	<1	50	5	30	MINI-14S	-40 to 85
V616ME05	1543	1618	1.5-8	25	-105	-78	0±3	-10	<5	<5	50	5	19	MINI-16	-40 to 85
V616ME10	1550	1620	1.5-8	25	-107	-83	0±3	-12	<5	<1	50	8	14	MINI-16-LOW	-10 to 55
V618SE03	1570	1680	2-15	30	-96	-72	12±2.5	-7	<20	<6	25	10	30	S	-30 to 80
V616ME04	1570	2130	1-18	47	-98	-69	5.5±2.5	-20	<20	<5	50	9	14	MINI-14S	-30 to 75
V602SE01	1580	1800	2-15	48	-100	-74	11±3	-10	<25	<2	30	10	25	S	-30 to 80
V604ME01	1590	1925	2-20	58	-100	-75	6±3	-10	<8	<2	50	12	22	MINI-14H	-30 to 70
V604SE01	1600	2200	0-20	45	-95	-75	15±2	-5	<36	<2	50	10	37	S	-30 to 70
V618SC01	1610	1750	0-12	25	-95	-74	15±2	-10	<42	<5	50	15	29	S	0 to 70
V622ME10	1625	1661	1-4	35	-100	-73	2±2	-15	<10	<10	50	5	20	MINI-14H	-30 to 85
V618ME01	1627	1661	0-3	48	-100	-77	-3±2	-10	<5	<10	50	3	18	MINI-14S	-25 to 70

Part Number	Max. Start Frequency (MHz) 1	Min. Stop Frequency (MHz) 1	Tuning Voltage (Vdc)	Tuning Sensitivity (MHz/V) 2	Phase Noise @10 kHz (dBc/Hz) 3	Phase Noise @1 kHz (dBc/Hz) 3	Output Power (dBm) 4	Harmonic Suppression (dBc) 5	Pulling 1.7:1 VSWR (MHz) 6	Pushing (MHz/V) 7	Input Capacitance (pF, max.) 8	Supply Voltage (Vdc, nom.) 9	Supply Current (mA, typ.) 10	Package Style	Operating Temperature (º C) 11
V603HS02	1630	1930	0-11	40	-98	-82	10.5±2.5	-10	<17	<1	50	10	30	S	-20 to 85
V604ME03	1630	1970	2-10	73	-97	-69	6.75±2.75	-12	<5	<5	50	10	25	MINI-14S	-40 to 70
V605SE01	1650	1950	3-12	45	-95	-70	12.5±1.5	-10	<20	<2	50	12	28	S	-30 to 85
V605SE04	1675	1925	3-11	41	-101	-76	11.25±2.75	-9	<19	<2	50	12	24	S	-30 to 85
SMV1720L	1680	1760	0.3-2.7	142	-88	-65	7.25±3.25	-10	<25	<20	50	3	14	SUB-L	-20 to 70
V621ME01	1683	1743	1.5-8	22	-108	-84	5±2	-11	<5	<4	50	8	18	MINI-16L	-10 to 85
V660ME03	1690	1925	2-12	40	-98	-72	4.5±2.5	-8	<25	<5	50	9	14	MINI-14H	-30 to 75
V660ME04	1690	1925	2-20	40	-98	-70	9±2	-8	<25	<5	50	10	15	MINI-14H	-30 to 75
V660ME02	1700	1900	1.5-10.5	37	-95	-70	11±2	-8	<25	<5	50	10	30	MINI-14H	-40 to 70
V605ME03	1700	1850	0-10	25	-100	-73	3.5±2	-7	<5	<5	50	11	29	MINI-14S	-30 to 70
V660ME01	1710	1750	0.5-4.5	70	-90	-70	4±2	-10	<15	<6	50	5	17	MINI-14H	-30 to 70
V613ME03	1722	1777	1-5	25	-103	-80	-2±3	-10	<5	<5	50	5	18	MINI-14S	-40 to 85
V612ME01	1730	1800	0.5-4.5	43	-100	-76	6.5±2	-15	<10	<5	50	5	23	MINI-14S	-40 to 85
V605MC01	1750	2500	2-17	70	-90	-70	6.5±4.5	-15	<23	<2	50	10	21	MINI-14H	0 to 70
V605ME02	1770	1915	1.5-12	25	-99	-69	0±3	-11	<8	<8	100	8	18	MINI-14S	-10 to 85
V670MC01	1780	2580	0-18	70	-90	-61	6.5±3	-10	<9	<8	50	15	42	MINI-14H	0 to 70
V672MC01	1800	2500	1-12	90	-90	-60	6.25±3.25	-10	<15	<5	50	15	34	MINI-14H	0 to 70
V613ME04	1805	1880	1-8	21	-105	-83	3±3	-11	<5	<2	50	5	18	MINI-16	-40 to 85
V613ME01	1805	1880	1.5-8	22	-104	-80	6.25±2.25	-12	<7	<1	50	8	14	MINI-16-LOW	-10 to 55
SMV1845	1815	1875	0.3-4.7	58	-92	-70	8±2.5	-12	<25	<9	50	5	14	SUB	-20 to 85
V674ME01	1820	2480	0.5-9.5	115	-96	-70	6±3	-7	<20	<5	50	10	13	MINI-14H	-40 to 85
V614ME01	1850	1910	0.5-4.5	38	-97	-71	7±2	-10	<15	<5	50	5	23	MINI-14S	-40 to 85
V614ME02	1860	2160	2-8	69	-101	-73	8.25±2.75	-13	<15	<2	50	9	22	MINI-14S	-30 to 85
V610ME01	1870	2010	2-10	45	-90	-70	14±2	-10	<50	<4	50	12	25	MINI-14H	-20 to 70
V603ME07	1896	1924	0.5-5	18	-105	-80	4±2.5	-15	<5	<3	50	4.5	28	MINI-14S	-40 to 85
V610ME03	1900	2140	1-8	60	-97	-71	10±2	-8	<20	<10	50	9	31	MINI-14H	-40 to 75
V608ME06	1900	2270	2-10	92	-91	-61	7±3	-4	<25	<5	50	12	15	MINI-14H	-40 to 70
V624ME01	1930	1990	1.5-8	20	-107	-84	5±3	-10	<5	<2	50	8	21	MINI-16L	-10 to 85
V604S003	1930	2230	1-11	40	-97	-72	11±2	-5	<30	<4	50	10	26	S	-20 to 85
SMV1960L	1938	1983	1-4	110	-92	-65	13.5±2.5	-7	<20	<10	50	5	25	SUB-L	-30 to 85
V602MC02	1950	2150	0.5-4.5	75	-90	-65	6±2	-10	<20	<5	50	4.5	16	MINI-14H	-40 to 75
V620ME01	1990	2140	2-10	50	-95	-73	12±2	-10	<60	<1	50	12	27	MINI-14H	-20 to 70
V626ME01	1990	2380	0.5-15	51	-100	-73	10.25±2.75	-6	<15	<5	25	9	18	MINI-14H-LOW	-30 to 85
SMV2100L	2050	2150	0-3	115	-86	-61	8.25±2.25	-8	<25	<25	50	3	14	SUB-L	-30 to 70
SMV2110L	2050	2150	0.6-4.3	106	-88	-63	7.5±2.5	-9	<20	<15	50	3	13	SUB-L	0 to 70
V640ME01	2079	2081	0.5-4.5	16	-101	-73	4±3	-17	<5	<5	50	5	34	MINI-14S	-40 to 85
V630ME01	2085	2220	0.5-4.5	60	-98	-73	5±3	-10	<15	<5	50	5	15	MINI-14H	-40 to 85
V801SE01	2100	2500	3-11	100	-90	-65	12±2	-10	<17	<2	50	12	28	S	-30 to 85
SMV2165L	2118	2218	0-3	122	-89	-65	8.5±3.5	-12	<20	<20	50	3	16	SUB-L	-40 to 85
SMV2165A	2118	2218	0-3	148	-91	-67	6±3	-10	<15	<15	50	3.3	16	SUB-L	-40 to 85
SMV2170L	2120	2220	0.5-3.5	135	-88	-62	9±3.5	-10	<25	<10	50	4	15	SUB-L	-40 to 85
SMV2175L	2120	2220	0-3.5	130	-81	-59	-2.5±2.5	-20	<15	<15	50	3.3	6	SUB-L	-30 to 70
SMV2180L	2120	2220	0-3.5	120	-89	-62	7±3	-11	<20	<10	50	3.5	13	SUB-L	-30 to 85
V802SE02	2135	2465	2-14	35	-100	-75	11±2	-20	<11	<1	50	12	28	S	-30 to 70
SMV2200L	2135	2285	0-3	165	-86	-61	9.5±2.5	-15	<35	<30	50	3	16	SUB-L	-15 to 60
V630ME09	2190	2330	0-5	53	-94	-70	4±4	-10	<20	<10	50	4.5	13	MINI-14H	-30 to 85
V630ME08	2190	2330	0.5-4.5	80	-92	-67	4±3	-20	<10	<5	50	4.5	15	MINI-14H	-30 to 85
V802SE04	2195	2480	2-15	35	-97	-70	11±3	-15	<15	<4	25	10	27	S	-30 to 80
V630ME02	2200	2285	0.5-4.5	53	-94	-70	4±3	-10	<16	<6	50	4.5	14	MINI-14H	-30 to 85
V800S001	2200	2700	0-20	55	-95	-75	13±2	-10	<40	<10	50	12	32	S	0 to 70
V802ME05	2200	2400	0.5-8	53	-91	-68	5.25±3.25	-15	<15	<10	50	5	17	MINI-14H	-30 to 80
V802ME06	2225	2350	1-8	44	-91	-63	11±2.5	-15	<15	<5	50	9	30	MINI-14H	-40 to 75
V802SE03	2230	2570	2-14	35	-100	-74	11±3	-15	<15	<2	50	12	28	S	-30 to 70
V804ME03	2230	2570	1.5-10.5	81	-91	-64	5.5±3.5	-20	<20	<5	50	10	25	MINI-14H	-40 to 70
V604MC02	2250	2510	0-6	65	-90	-67	5±2	-15	<16	<11	20	3	16	MINI-14H	-5 to 75
V800ME05	2270	2360	0.5-4.5	47	-96	-70	4±3	-20	<15	<5	50	5	14	MINI-14H	0 to 70
V802ME03	2275	2475	0.5-8	44	-94	-70	3±5	-15	<12	<4	50	5	16	MINI-14H	-30 to 80
V802SE05	2285	2595	2-16	35	-97	-72	10±3	-20	<25	<4	50	10	22	S	-30 to 70
SMV2390L	2290	2485	0-4	116	-90	-64	10±2.5	-11	<25	<10	50	5	16	SUB-L	-30 to 70
SMV2385L	2290	2485	0-3.3	142	-86	-60	10±2	-15	<25	<35	50	3	18	SUB-L	-30 to 70

Part Number	Max. Start Frequency (MHz) 1	Min. Stop Frequency (MHz) 1	Tuning Voltage (Vdc)	Tuning Sensitivity (MHz/V) 2	Phase Noise @10 kHz (dBc/Hz) 3	Phase Noise @1 kHz (dBc/Hz) 3	Output Power (dBm) 4	Harmonic Suppression (dBc) 5	Pulling 1.7:1 VSWR (MHz) 6	Pushing (MHz/V) 7	Input Capacitance (pF, max.) 8	Supply Voltage (Vdc, nom.) 9	Supply Current (mA, typ.) 10	Package Style	Operating Temperature (º C) 11
V805ME03	2300	2650	2-9	72	-97	-71	6±3	-15	<15	<2	50	10	18	MINI-14H	-30 to 70
V800SE01	2300	2700	0-20	55	-95	-75	14±2	-10	<40	<1	50	10	36	S	-40 to 85
V803ME01	2300	2700	2-20	83	-88	-59	8.5±2.5	-10	<25	<4	50	12	21	MINI-14H	-30 to 70
V804ME04	2300	2500	1.5-10.5	43	-99	-74	10±2	-20	<35	<5	50	10	16	MINI-14H	-40 to 70
V803SE01	2350	2650	2-8.5	75	-95	-74	11±2	-10	<60	<1	50	12	27	S	-40 to 85
V630ME03	2370	2515	0.5-4.5	90	-94	-68	3.5±2.5	-10	<25	<15	100	4.5	11	MINI-14H	-30 to 85
SMV2488	2388	2588	0.5-4.5	145	-87	-63	10.5±2	-20	<30	<25	50	3	18	SUB-L	0 to 70
V800ME04	2400	2484	0.5-4.5	50	-95	-70	5.5±2.5	-15	<15	<5	50	5	15	MINI-14H	0 to 70
V800ME08	2400	2485	0.5-4.5	47	-95	-70	5.5±2.5	-13	<15	<5	50	5	15	MINI-14H-L	-40 to 85
V800ME10	2400	2485	0.5-4.5	60	-95	-72	5±2	-22	<15	<2	50	5	15	MINI-14H-L	-30 to 85
V807ME01	2400	2800	1-11	80	-92	-65	8.5±3	-10	<50	<10	50	9	16	MINI-14S	-40 to 75
SMV2500L	2400	2484	0-3	105	-87	-60	9.25±2.75	-20	<25	<30	50	3	19	SUB-L	-40 to 85
V801ME01	2406	2646	0.5-8	47	-94	-69	5±4	-15	<9	<10	50	5	23	MINI-14H	-30 to 80
SMV2475L	2430	2520	0-3	130	-87	-62	10±2	-12	<20	<30	50	3	19	SUB-L	-40 to 85
SMV2490L	2450	2530	0.5-4.5	112	-89	-63	12.5±2.5	-10	<30	<10	50	5	21	SUB-L	-30 to 85
V630ME04	2460	2600	0.5-4.5	73	-94	-70	3.5±3	-10	<20	<10	100	4.5	11	MINI-14H	-30 to 85
V806ME03	2500	2600	1-10	61	-94	-69	5.75±3.25	-15	<20	<10	50	5	20	MINI-14H	-40 to 85
V805ME02	2500	2700	1.5-10.5	41	-98	-75	8.5±2.5	-15	<20	<2	50	10	18	MINI-14H	-40 to 70
V806ME01	2516	2655	0.5-7.5	40	-96	-74	4±2	-20	<25	<5	50	5	13	MINI-14H	-30 to 80
V806ME04	2540	2600	0.5-4.5	42	-96	-75	4±2	-20	<25	<5	50	5	13	MINI-14H	-30 to 80
V805SE01	2550	2850	3-11	85	-90	-60	12±2	-10	<44	<3	50	12	25	S	-30 to 85
V804ME01	2560	2800	0.5-7.5	74	-94	-71	1.5±3.5	-15	<15	<6	50	5	13	MINI-14H	-30 to 80
V808ME01	2560	2970	2-20	72	-87	-61	8.5±2.5	-10	<45	<6	50	9	15	MINI-14S	-30 to 75
V810SE01	2600	3000	2-12	77	-87	-64	13±3	-10	<60	<5	50	15	30	S	-35 to 80
V810SE02	2600	3000	2-12	70	-90	-63	12±2.5	-10	<35	<10	25	12	23	S	-30 to 80
V810SE03	2600	3000	3-11	75	-90	-64	11.25±2.75	-14	<30	<5	50	12	23	S	-30 to 80
SMV2660L	2620	2700	0.5-4.5	90	-91	-66	13.5±2.5	-17	<30	<10	50	5	21	SUB-L	-30 to 85
V806ME02	2650	2735	0.5-7.5	43	-94	-70	2.25±2.25	-20	<15	<5	50	5	14	MINI-14H	-30 to 80
V630ME05	2665	2810	0.5-4.5	73	-95	-72	5±3	-14	<20	<10	50	4.5	16	MINI-14H	-30 to 85
V630ME13	2700	2900	0.5-4.5	75	-95	-71	4.75±3.25	-15	<30	<10	50	4.5	18	MINI-14H	0 to 85
V810ME01	2800	3400	2-20	65	-85	-62	7±3	-10	<20	<10	50	8	31	MINI-14H	-30 to 75
V630ME10	2800	2870	0.5-4.5	65	-93	-69	7±2.5	-15	<25	<10	50	4.5	15	MINI-14H	-30 to 85
V840MC01	3100	3500	2-18	80	-85	-55	6±3	-20	<20	<10	50	8	30	MINI-14H	-20 to 60
V843ME01	3100	3600	2-20	70	-85	-60	8±2	-20	<25	<15	50	8	30	MINI-14H	-30 to75
V842ME02	3110	3320	2-10	48	-92	-65	7±2	-18	<20	<5	50	8	25	MINI-14H	-30 to 70
V844ME01	3200	3400	0.5-4.5	98	-88	-65	5±3	-15	<25	<15	50	5	22	MINI-14H	-30 to 75
V846ME01	3300	3625	1-11	112	-88	-64	7±3	-19	<20	<15	50	8	30	MINI-14H	-20 to 75
V900ME01	3500	4000	2-18	40	-90	-64	6±3	-20	<20	<7	50	8	26	MINI-14H	-20 to 60
V910ME01	3930	4200	1.5-11	45	-86	-56	1±3	-20	<10	<5	50	5	16	MINI-14SL	-35 to 80
V950ME01	4420	4620	1.5-11	36	-85	-56	0±3	-15	<20	<10	50	5	14	MINI-14S	-35 to 80
V940ME02	5220	5420	0.5-4.5	108	-83	-55	-1±3	-25	<35	<10	50	5	12	MINI-14S	-30 to 85
V940ME03	5725	5875	0.5-4.5	105	-87	-58	0±3	-30	<15	<5	50	5	27	MINI-14S	-30 to 85

MOUNTING AND GROUNDING OF LEADED Z-COMM VCOs

Z-COMM pin package VCOs contain 5 grounding pins (see figure 1). Each must be soldered to the PCB ground plane and the VCO must maintain direct contact with the groundplane conductor to ensure proper operation (see figure 2)

The following are dimensions for the "P" package and recommended layout. For other Z-COMM pin mount packages, the same mounting and grounding principles apply, however the layout should be scaled according to the corresponding outline drawing dimensions.

figure 1: Outline Drawing For P Package

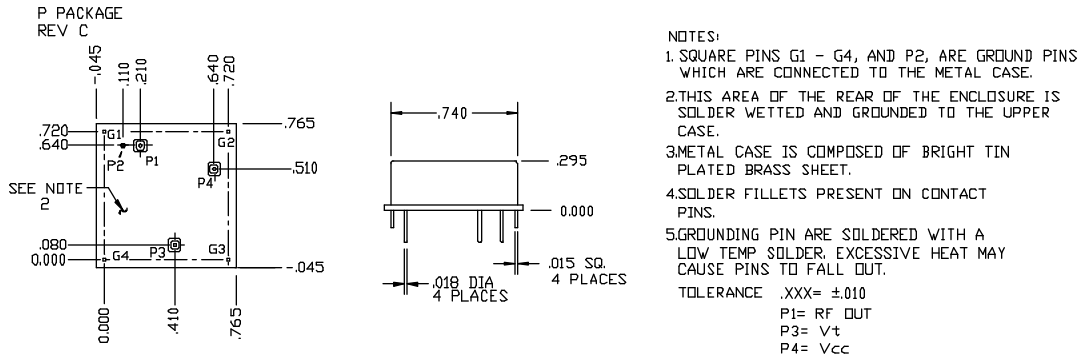
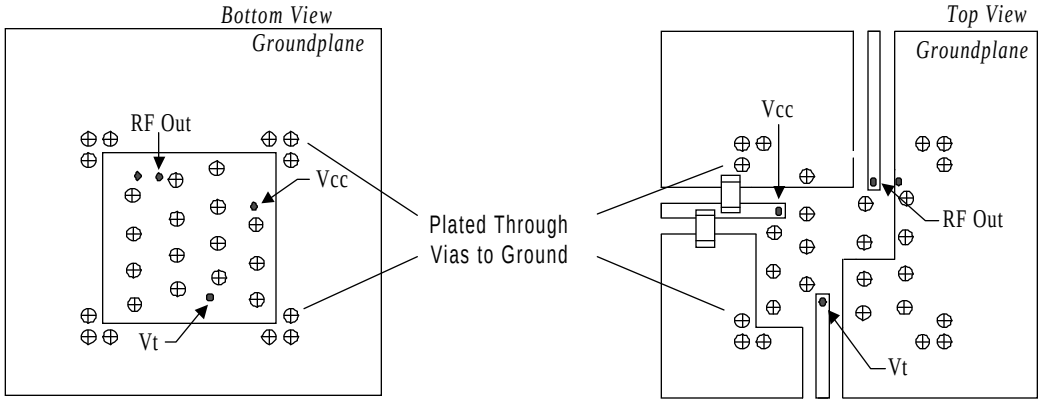


figure 2: Recommended Board Layout



*LAYOUT IS NOT TO SCALE

Notes:
1.) PCB material is FR-4 and bottom surface is ground plane.
2.) Plated through holes are necessary to minimize unwanted reactance to ground.
3.) Bypass capacitors are used on the Vcc line to suppress supply noise.
4.) Holes should be larger than VCO pin diameter (.018") to accommodate solder normally present at PCB pin junction.
5.) It may be necessary to countersink the PCB to accomodate solder fillets as noted in (4) of figure 1.

For additional information refer to the following application notes:

AN-102 Proper Loading of Voltage Controlled Oscillators
AN-107 VCO Package Soldering Technique

MOUNTING AND GROUNDING OF Z-COMM SURFACE MOUNT VCOs

Z-Comm VCOs are available in several surface mount packages. The VCO ground plane should be in direct contact with the PCB ground plane which must consist of a conductor covering the full underside of the VCO package (see figure 2).

The following are dimensions for the "Mini-16" package and a recommended mounting layout. For other Z-COMM surface mount packages the same mounting and grounding principles apply, however the layout should be scaled according to the corresponding outline drawing dimensions.

figure 1: Outline Drawing for MINI-16 Package

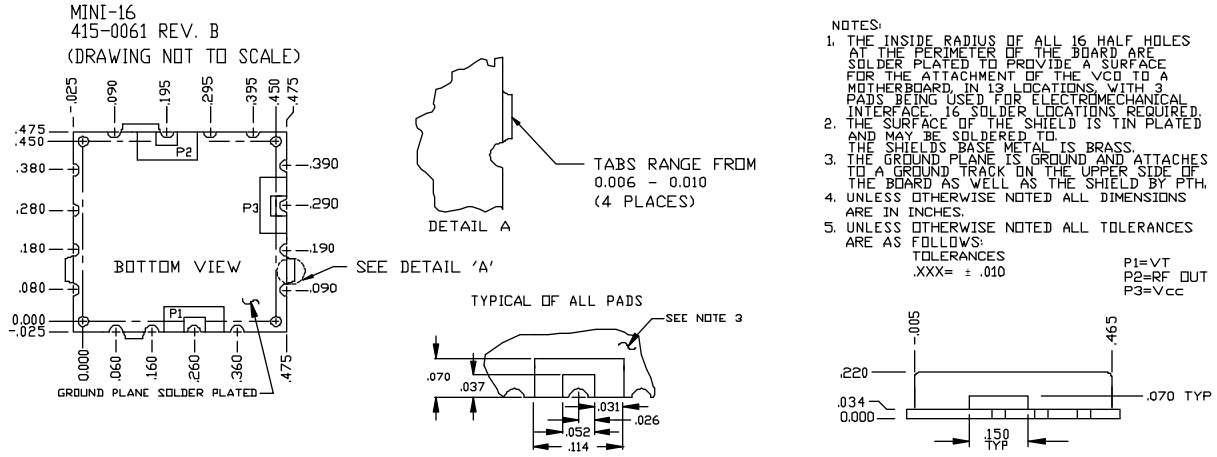
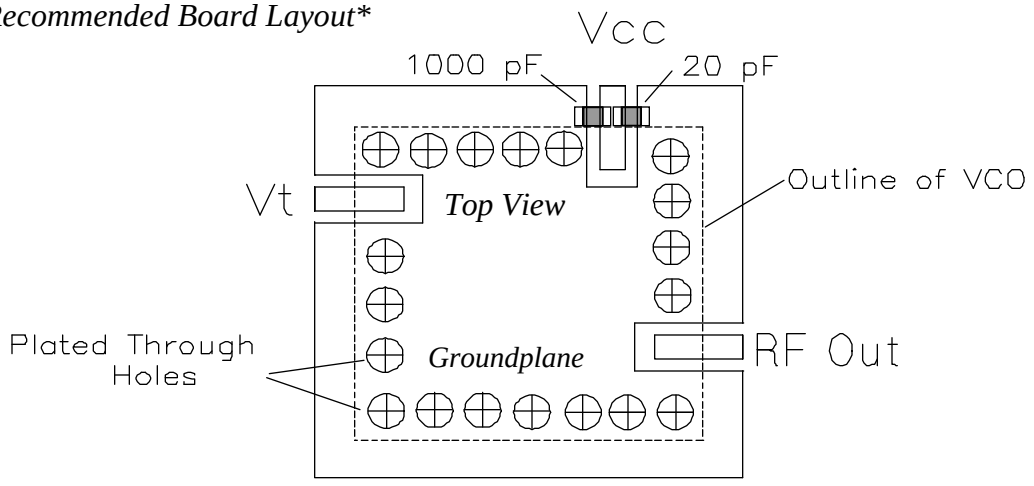


*figure 2: Recommended Board Layout**



*LAYOUT IS NOT TO SCALE

Notes: 1.) PCB material is FR-4 and bottom surface is a ground plane
2.) Plated through holes are necessary to minimize unwanted ground reactance.
3.) Bypass capacitors are used on the Vcc line to suppress supply noise.
4.) Depending on the output frequency, additional vias may be necessary on the groundplane of the customer's board layout.

For additional information refer to the following application notes:
AN-102 Proper Loading of Voltage Controlled Oscillators
AN-107 VCO Package Soldering Technique

PROPER OUTPUT LOADING OF Z-COMM VCOs

Z-COMM VCOs are designed to operate with an output VSWR of less than 1.67:1 (RL = 12.0 dB). To tolerate impedance mismatch introduced by loading device(s) (e.g. mixers, prescalars) some form of isolation is needed at the RF output. A 10 dB pad and buffer amplifier are recommended (Zout = 50Ω for all Z-COMM VCOs) to fulfill this requirement.

Problems associated with insufficient isolation include, increased power output fluctuation, degraded phase noise performance, and increased pulling (load dependent frequency variation).

Figures 1 and 2 represent typical circuit and layout for a VCO operating near 1 GHz.

figure 1: Schematic Drawing

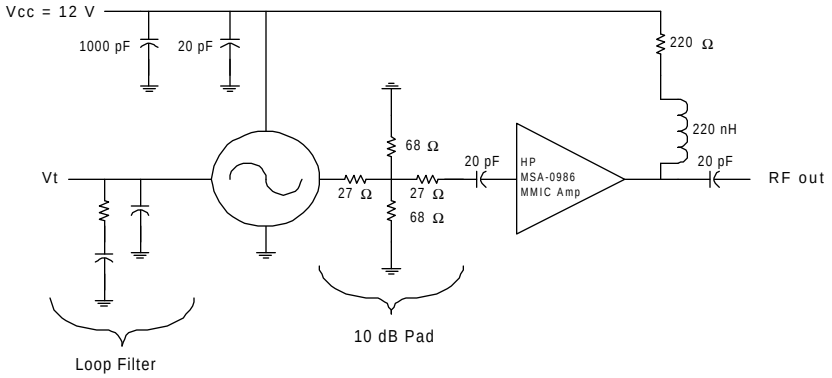
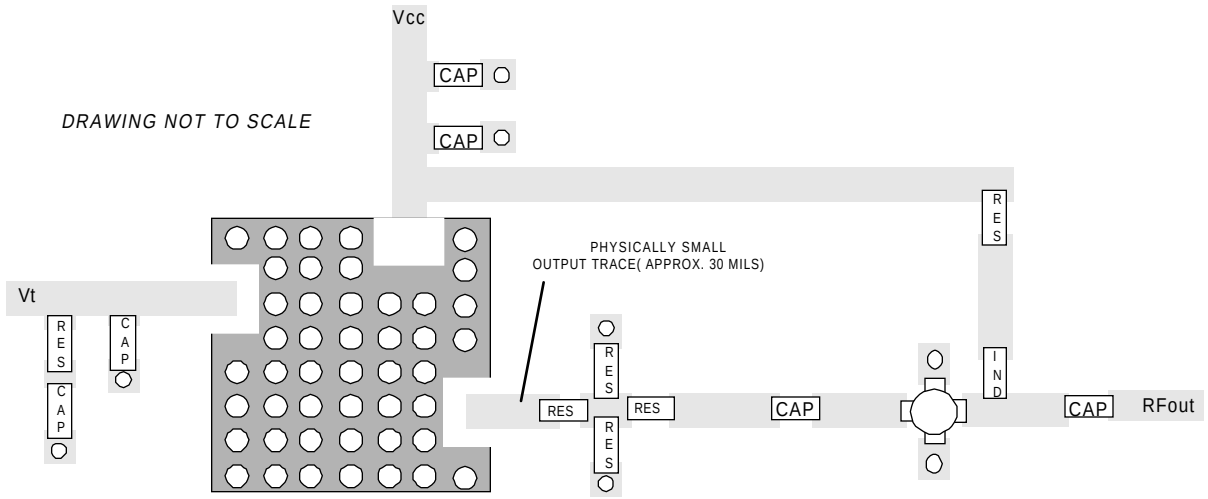


figure 2: Typical Layout (MINI Package VCO)

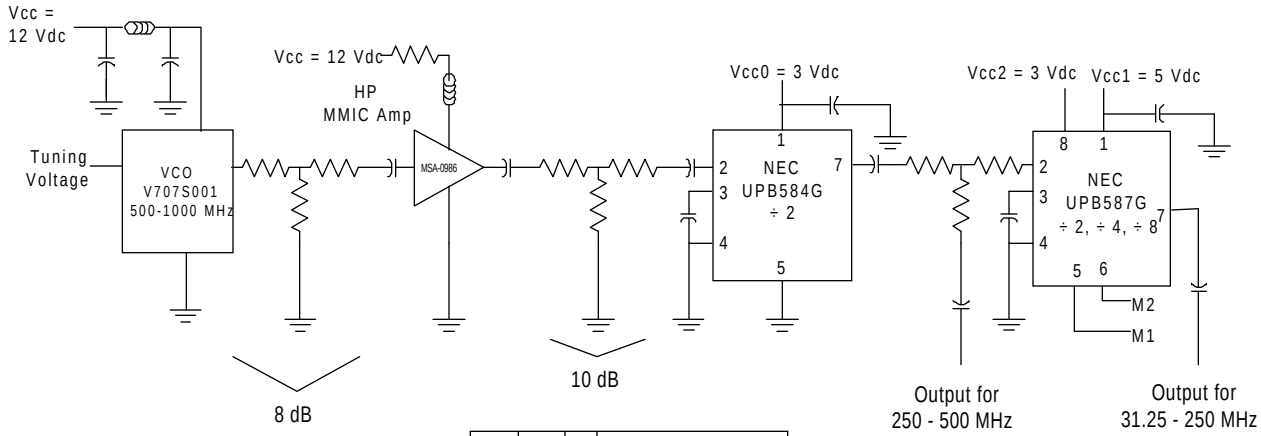


Notes: 1.) Coupling capacitors and bypass capacitors are frequency dependent.
2.) Minimize the distance between the 10dB pad and VCO RF output.
3.) Layout design must adhere to standard RF design practices (i.e., 50 microstripline line must be used, proper grounding [see ***AN-101 Mounting and Grounding of VCOs***], and careful component selection is necessary.)

LOW COST, EXTREMELY WIDE BANDWIDTH VCO DESIGN USING PRESCALERS AND Z-COMM VCOs

Many of Z-COMM's higher frequency VCOs can be converted, by the use of prescalers, into an extremely wide band, low frequency VCO at a low cost. For the following example, a 500-1000 MHz VCO will be converted into a 31.25-250 MHz VCO with the use of low cost programmable prescalers, such as the NEC UPB584G and UPB587G. Figure 1 represents a typical circuit layout.

figure1: Schematic Drawing.



M1	M2	÷	Frequency Output
L	L	8	31.25 - 62.5 MHz
L	H	4	62.5 - 125 MHz
H	H	2	125 - 250 MHz
Vcc2 = 0 Vdc			250 - 500 MHz

Assumes Vcc0 = 3 Vdc, always

In order to acheive the extremely wide bandwidth, the properly loaded output signal of the Z-COMM VCO will be subjected to a series of prescalers. The first prescaler, such as the NEC UPB584G, will divide the signal in half yielding an output of 250-500 MHz. In order to achieve 31.25 MHz, a programmable prescaler, such as the NEC UPB587G, is needed. An 8-10 dB pad is recommended for proper matching of the signal between the two prescalers. The NEC UPB587G functions off of two TTL switches. When M1 and M2 are in the low state, the prescaler is a divide by 8 yielding a frequency output of 31.25-62.5 MHz. When M1 is in the low state and M2 is in the high state, the prescaler is a divide by 4 yielding an output of 62.5-125 MHz. When M1 and M2 are in the high state, the prescaler is a divide by 2 yielding an output of 125-250 MHz. When Vcc2 =0 Vdc, the output of the prescaler is 250-500 MHz. Vcc0 and Vcc1 are assumed 3Vdc and 5Vdc, respectfully, at all times.

For additional information refer to the following Z-COMM application notes:

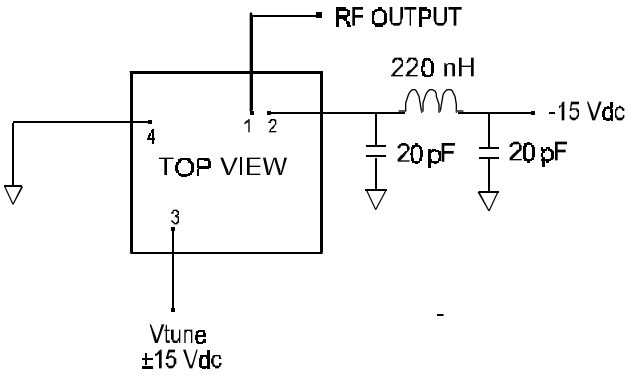
AN-102 Proper Loading of Voltage Controlled Oscillators

AN-101 Mounting and Grounding of VCOs

USING BIPOLAR BIASING TO OBTAIN THE FULL TUNING RANGE CAPABILITY OF Z-COMM VCOs

Many of Z-COMM's voltage controlled oscillators operate within a voltage tuning range of zero to 30 volts. If necessary, these voltage ranges can be obtained by using a ±15 V power supply. The following is the recommended configuration for proper ±15 volt operation (refer to Figure 1).

figure 1: TYPICAL CONNECTION DIAGRAM

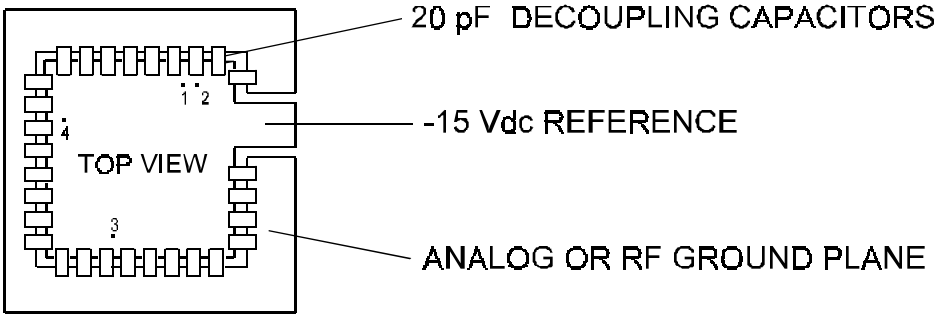


1) *Connect Pin #4 to Analog Ground*
2) *Connect Pin #2 to -15 Vdc*
3) *Provide the Tuning Voltage (Vtune) of -15 to +15 Vdc to Pin #3 to Tune the Entire Frequency Range*

In this configuration, it must be noted that:

A) In order to minimize noise, thirty 20 pF chip decoupling capacitors, actual quantity will vary with respect to the size of the VCO package, must be provided in between Pin #2 and analog ground (refer to Figure 2). Pin #2 is the ground plane of the VCO.

figure 2: MINIMIZING NOISE



B) The user should provide for up to 40 mA of current (Icc) on the -15 Vdc line (Pin #2)
C) A 50 ohm load impedance is required for power output matching.

For additional information refer to the following application notes:

AN-101 Mounting and Grounding of VCOs
AN-102 Proper Output Loading of VCOs
AN-107 VCO Package Soldering Technique

BAND SWITCHING VOLTAGE CONTROLLED OSCILLATORS

This note describes how additional tuning bandwidth can be obtained by band switching two VCOs with a TTL compatible input.

Circuit Operation (figure 1) can be described as follows:

Input High: Q1 is forward biased allowing the devices collector voltage to approach 0v. This in turn forward biases Q2, switching VCO1 on. Q3 and Q4 remain off (in cutoff) keeping VCO2 off.

Input Low: Q1 is off and the devices positive collector voltage turns Q2 off (VCO1 is therefore off) and Q4 on. As a result, Q3 is forward biased allowing VCO2 to turn on.

figure 1: Schematic Drawing

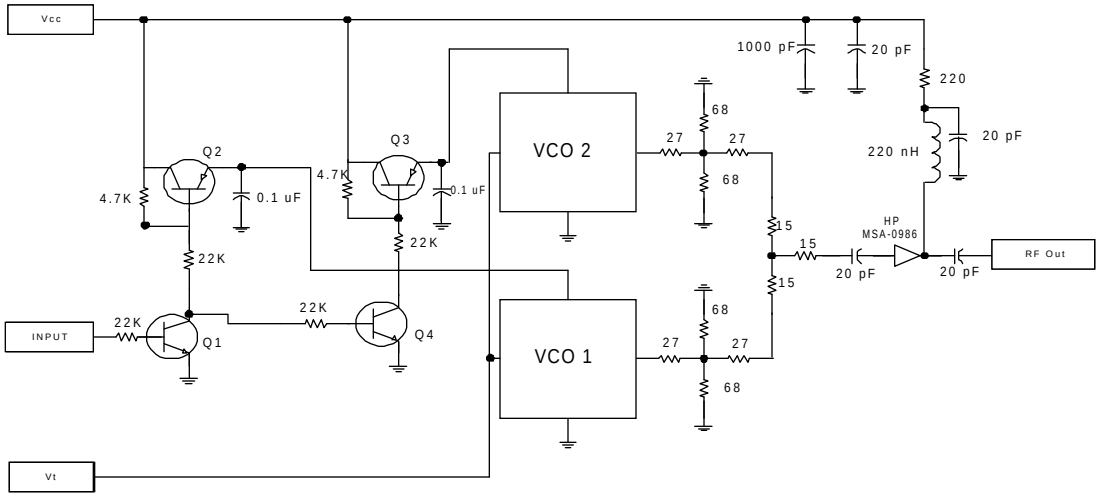
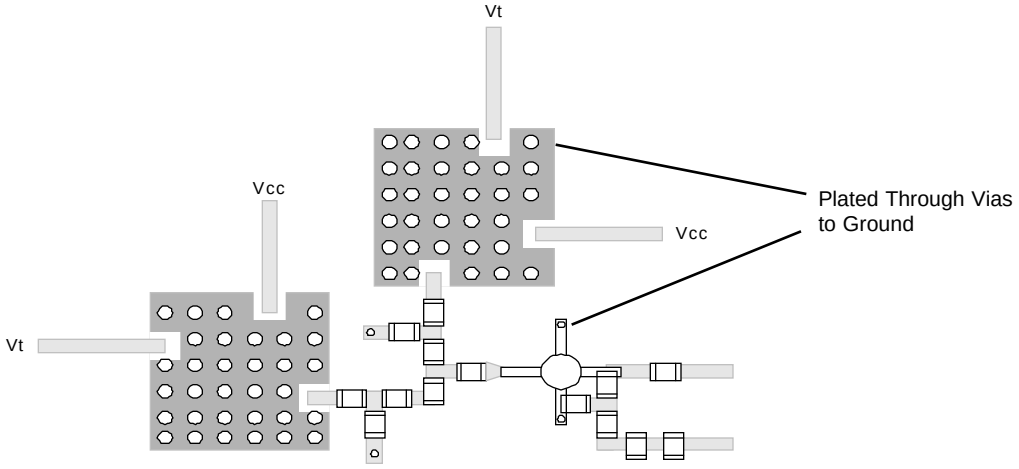


figure 2: Typical Output Circuitry Layout: MINI Package VCO (not drawn to scale)



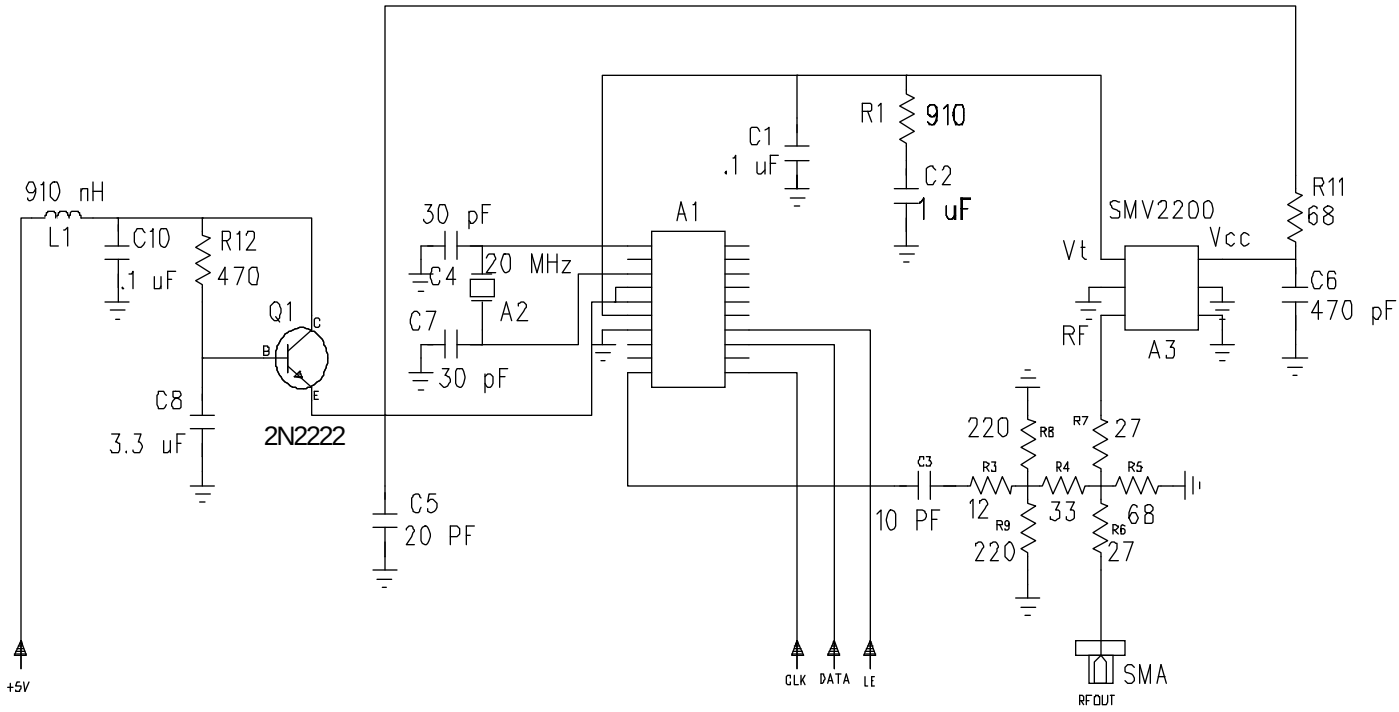
Notes: 1.) Component values listed for operation at 1 GHz.
2.) Transistors are general switching type.

For additional information refer to the following Z-COMM application notes:

AN-102 Proper Loading of Voltage Controlled Oscillators
AN-101 Mounting and Grounding of VCOs

USING Z-COMM SUBMINIATURE VCOs FOR WLAN SYSTEMS

The following application note gives an overview of a 2.2 GHz Synthesizer design and offers design tips to help optimize performance with minimal development time. The circuit schematic is listed below with a general description, and details on individual blocks, following this. The discussion emphasizes the practical aspects of configuring the loop, and assumes the designer has a basic understanding of phased locked loop theory.



Synthesizer Circuit Description

The circuit incorporates Z-COMM's SMV2200L VCO and Motorola's MC12210 Digital PLL IC. The loop has capability of tuning 2150 to 2250 MHz in 1 MHz steps. Both components are PCMCIA type II compatable, making them suitable for ISM band WLAN transceivers.

A resistive power splitter/attenuation pad couples the VCO output power and offers 10 dB insertion loss (20 dB isolation) from the VCO output to the synthesizer output. This isolation is necessary to minimize determental effects of load mismatch on VCO performance.

As illustrated above, the circuit has been configured for evaluation with a lab power supply (5v). Appropriate changes for the operation with a regulated 3v supply are described in the "battery operation" section.

The IC on-board crystal oscillator circuity is utilized with an external HC49/U package crystal. The 20 MHz value was chosen because it is readily available at low cost with high tolerance and stability. The actual comparison frequency (1 MHz), however, is determined by the reference divider. Surface mount PCMCIA type II package compatible crystals are also available (at higher cost).

Z-Communications SMV2200L VCO

The SMV2200L was selected as the output frequency range of the VCO makes it suitable for both PCS (high side injection) and 2.4 GHz ISM (low side injection) applications. Synthesizer design analysis is simplified by the fairly linear tuning sensitivity across the specified frequency range. Also, due to the large input modulation bandwidth of the voltage tuning port, its impedance has negligible effect on the phase margin. Therefore, PLL loop stability can be assured based on design calculatons rather than of trial and error.

VCO Specifications:

Vcc:	3v
Icc:	22mA max.
Vt:	0 to 3v
Power Output:	10 ± 3 dBm
Package:	.30 x .30 x .08 in.

Motorola MC12210 Synthesizer IC

Operating at 3v and 9.5mA, the MC12210 economizes space and power. The internal dual modulus prescalar will operate up to 2.5 GHz eliminating the need for an external frequency prescalar. This advantage not only reduces cost and layout space but also is beneficial since the comparison frequency can be set equal to the channel step size allowing maximum loop bandwidth to be utilized in appications with limited channel spacing.

Similar to many modern PLL IC's the device relies on a digital frequency phase detector. As opposed to other topologies this configuration utilizing the on board charge pump offers maximum pull in range (i.e. the pull in range of the synthesizer equals the frequency range of the VCO.

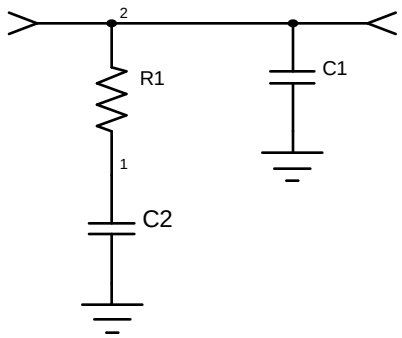
PLL IC Specifications:

Vcc:	3v
Icc:	9.5 mA typ.
Input Frequency:	2.5 GHz max.
Data Bus:	Serial (Data, Clk, LE)
Package:	TSSOP

Synthesizer Loop Filter

A second order loop passive filter (third order loop) was selected because it offers easy analysis (vs. higher order filters) and greater reference suppression than a first order design. The increased power consumption, size, and potential of increased noise, made the active filter impractical in this case.

The fairly linear tuning sensitivity of the VCO and moderate frequency bandwidth of the synthesizer made it easy to determine component values which yielded a stable loop with fairly constant loop bandwidth vs. operating frequency.



The loop bandwidth was selected to minimize overall phase noise. This coincides with establishing a bandwidth such that the VCO phase noise equals the reference phase noise divided up (5 KHz in this case). C2 has the primarily determines this figure so the appropriate value is calculated (1 uF).

At this point C1 and R1 are evaluated. The desired phase margin is determined by the level of reference suppression necessary and the amount of phase noise peaking the system can tolerate. As the reference power at the output is decreased (by increasing C1 or R1), phase margin is also reduced and phase noise peaking increases. A satisfactory compromise was establishing with a phase margin of 40º (C1=.1uF and R1=470).

The SMV2200L input tuning circuitry had neglible effect on the analysis as it's pole was located several decades above the loop bandwidth frequency. The input circuitary pole of a VCO with a low modulation bandwidth, on the other hand, would have to be considered in the analysis. The additional pole will make a third order filter have response and special care must be taken to insure that the phase margin does not approach Oº as instabiltiy will result.

Although evaluation synthesizer loop bandwidth was sellected for minimum overall phase noise, two other aspects the designer may want to consider are switching time and microphonics.

Due to the limited charge pump supply current and wide channel spacing, the transient performance of the loop is predominately dictated by the duration of time required for C2 to charge (or discharge) before the loop aquires lock. As the loop bandwidth is increased, C2 decreases in value. Since the capacitor will charge quicker due to its smaller value, frequency acquistion time is decreased. With the circuit shown on page 1 the switching time was less than 3mS for a 100 MHz transistion. Phase aquistion is dependent on the phase margin of the loop. This phenomena, however, was not analyzed since it was significantly shorter (microseconds) than the frequency aquistion time.

An increase in loop bandwidth also is desirable in situations were microphonics is a problem. In general, increasing the loop bandwidth will reduce PLL noise susceptability to mechanical vibration. Steps also should be taken to secure components to the PCB with the best configuration possible.

Power Supply Filtering and Battery Operation

The evaluation synthesizer was configured for 5v operation and includes filtering circuitry to facilitate analysis in the lab.

Q1 is self biased in the active region and with the combination of R12 and C8 provides filtering of low frequency power supply noise. adequate decoupling is necessary since noise on the power plane can induce AM and FM modulation of the VCO.

The R-C filter at the VCO Vcc input reduces the voltage to the appropriate value (3v) and bypasses RF noise radiating from the VCO to ground.

For synthesizer implementation in a portable system with a regulated 3v supply, the transistor circuitry should be eliminated. Also, the R-C filter located adjacent to the VCO should be changed to an L-C filter so the 3v potential is maintained.

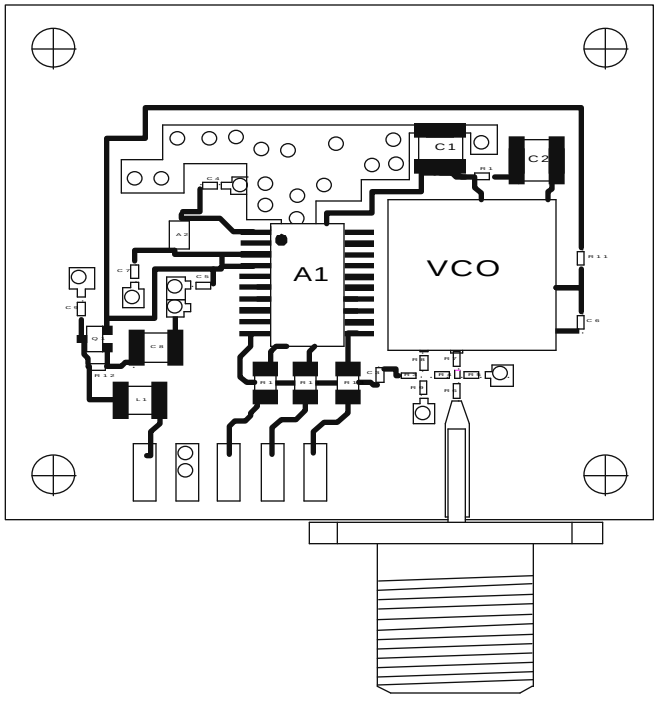
PCB Layout and Other Considerations

Proper component selection and placement plays an important role in minimizing design time. The synthesizer was configured on a double sided FR-4 PCB. The bottom side is solid ground plane and the component side has a large ground pad area with plated through holes for component grounding.

As can be seen in the drawing below, a "picket fence" of plated through vias runs parallel to the Vt trace (high impedance) to reduce noise susceptability from external sources. The entire synthesizer module can be isolated from external circuitry with a shield for additional reduction of noise. Plated through holes are also placed under the PLL IC and VCO for noise immunity.

The majority of the components are 0603 chip size. The capacitors are all ceramic with the exception of the loop filter capacitors which are polyester film surface mount. Although the physical size is larger than the ceramic equivalent, film capacitors do not experience random voltage changes associated with the ceramic type. This phenomema ofter results in unexplained "phase hits" observed at the synthesizer output.

Care also should be practiced in selecting tolerance and stability of the crystal and loop filter capacitors as their values have a significant impact on PLL performance.



MANUAL SOLDERING TECHNIQUE FOR Z-COMM VCOs

This note describes common manufacturing methods used to solder Z-COMM surface mount and pin mount VCOs. Following the suggested practices will ensure optimum performance and repeated product reliability.

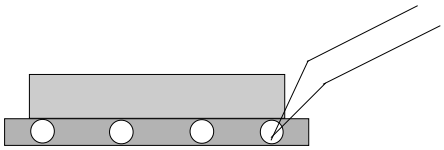
SURFACE MOUNT VCOs

The Mini, Sub-Mini, and S package devices can be soldered manually or through an automated process. Recommendations for both approaches are detailed below.

Manual Process:

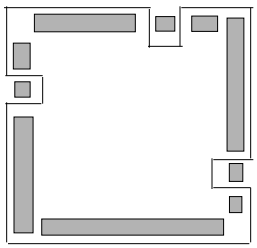
Apply solder to the half-moon connections around the periphery of the VCO package (see figure 1). Once the device's ground plane is heated, connection will normally require 5 seconds or less. For proper grounding, all of the contacts must be soldered. Care must be taken to ensure good solder connections without applying excess solder. Also, iron contact with VCO should be executed quickly to prevent heat damage.

figure 1:



Apply iron for no more than 7 seconds after ground plane is hot.

figure 2:



IR Reflow Process:

A typical solder stencil, as shown in figure 2, can be used to dispense solder at the half-moon contacts. A reflow process with appropriate IR reflow profile will ensure proper wetting and good VCO/PCB contacts. Reflow of components within the device must be avoided. All surface mount VCOs utilize SN95 solder with a melting temperature of 235º C.

PIN MOUNT VCOs

Z-COMM Pin Mount VCOs utilize SN63 internally for pin connections. During VCO installation special care must be taken not to overheat the contact pins as this will induce their upward movement into the VCO. Also, similar to surface mount devices, *the underside of the VCO must maintain intimate contact with the system PCB.* Any displacement will cause problems associated with inadequate grounding and/or loading isolation.

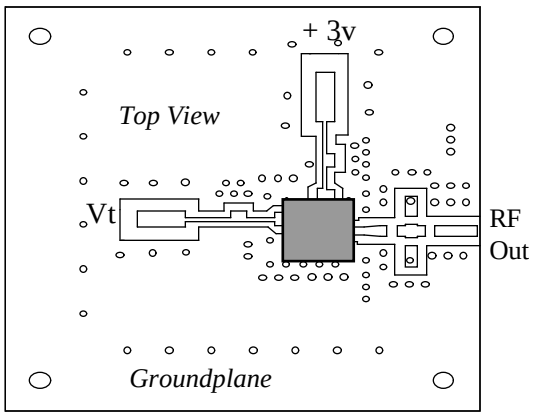
PROPER OUTPUT LOADING OF THE SMV2500 VOLTAGE CONTROLLED OSCILLATOR

Proper output matching of Z-COMM's SMV2500 VCO plays a critical role in duplicating published performance parameters. The SMV2500 will operate optimally when proper care is taken to isolate the VCO from external circuitry. This note illustrates a test board which can be used to analyze the device and also to demonstrate how the proper selection of components and layout can minimize load pulling.

The first step is to generate a board layout that ensures adequate grounding for the VCO package. The use of plated through holes will minimize noise susceptibility and optimize performance. Implementation of *a solder mask* on the test board *is not recommended* as it will decrease VCO noise immunity and contribute to unwanted power output variation.

The next step is to provide a good match at the VCO's output port. A 10 dB attenuation pad located physically close to the output terminal of the SMV2500 is suggested as shown in Figure 2. Care must be taken to ensure 50Ω microstrip line is used to couple this port .

Figure 1 illustrates a suggested PCB pattern. **Please note, test board layout is not to scale.**



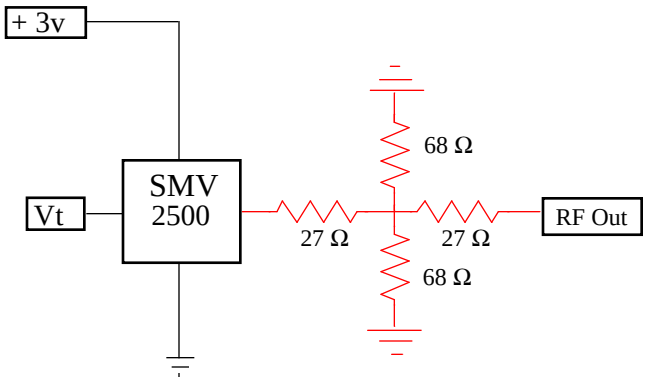


figure 1: SUGGESTED TEST BOARD LAYOUT

figure 2: TEST BOARD SCHEMATIC

The board, complete with VCO and supporting components, is available from Z-Communications. Contact the factory for details. The test board is intended specifically for designers demanding quick and accurate VCO performance measurement. It is also compatible with other VCO products offered in Z-COMM's SMV (Sub-Mini) package.

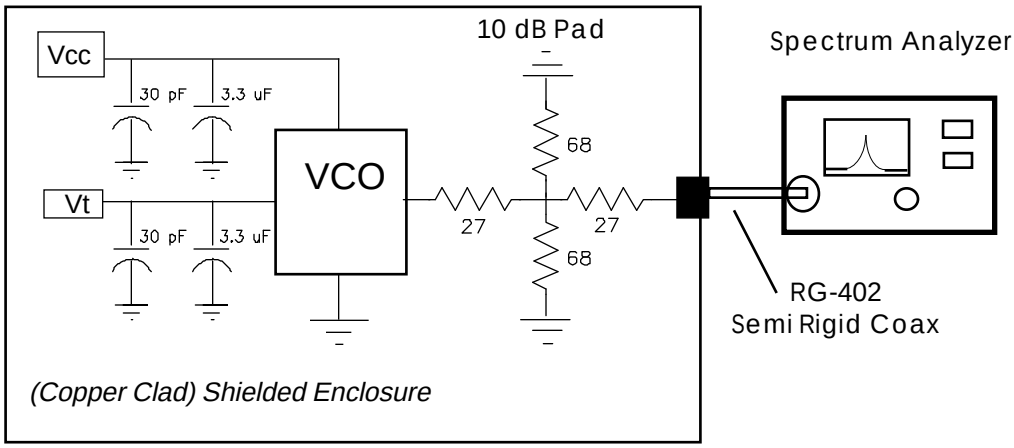
NOTE: 1.) The use of plated through holes and placement of the isolation (attenuation) pad in close proximity with the VCO is critical.
2.) The board material is FR-4 and measures 31 mils in thickness.
3.) Board trace width is 49 mils.
4.) The bottom surface of the test board is a ground plane.

PHASE NOISE MEASUREMENT OF Z-COMM VCOs

Published phase noise performance can be verified using the phase noise test setup and procedure described below. Measurement is conducted with the VCO free running. By following the suggested guidelines, noise performance readings at 1 and 10 KHz offset can be recorded on all of Z-COMM's VCO devices with little difficulty.

Notes:

1. To ensure accurate noise measurement without the influence of the power supply, the VCO is powered by batteries; e.g., lead acid.
2. The device under test must be properly grounded (**see AN-101 Mounting and Grounding of VCOs).** Also, bypass capacitors are included and located directly at the VCO inputs.
3. Supply and control voltage line length should be minimized; ideally, coaxial lines are used.



Procedure Using HP 8566B Spectrum Analyzer:

1. Set the control voltage of the VCO at mid-band (or at the frequency of interest). Enable the *signal track* function on the spectrum analyzer and gradually reduce the *frequency span* to approximately 50 KHz for a 10 KHz offset measurement or 10 KHz for a 1 KHz measurement.

2. Reduce the *video bandwidth* to improve the clarity of the display.

3. Record the display using the *view* function.

4. Using the *peak search* and *marker* functions, measure the amplitude of the spectrum at the desired offset frequency.

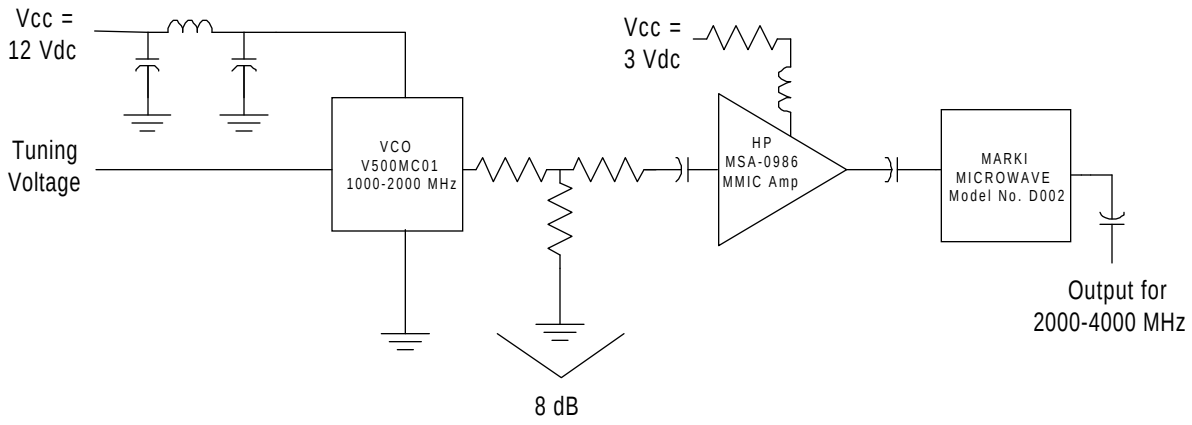
5. The phase noise performance at the desired offset of the VCO is approximately equal to:

£ [dBc/Hz] = Marker Amplitude [dBc] - 10 Log (resolution bandwidth [Hz])

LOW COST, EXTREMELY WIDE BANDWIDTH VCO DESIGN USING MULTIPLIERS AND Z-COMM VCOs

Many of Z-COMM's higher frequency VCOs can be converted, by the use of multipliers, into an extremely wide band high frequency VCO at a low cost. For the following example, a 1,000-2,000 MHz VCO will be converted into a 2,000-4,000 MHz VCO with the use of a low cost multiplier, such as the MARKI MICROWAVE Model No. D002. Figure 1 represents a typical circuit layout.

figure 1: Schematic Drawing



For this example, we will use the Z-COMM V500MC01 VCO. This VCO is a 1,000-2,000 MHz VCO that will be converted into a 2,000-4,000 MHz VCO. Once the V500MC01 is properly mounted and grounded, it is followed by an 8 dB resistive T-pad followed by a buffer amp for proper isolation. The signal will be fed into the multiplier device and provide an output of 2,000-4,000 MHz.

It is important to note that the single-side band phase noise will decrease -20 log N, where N is the multiplier factor. In this case, N=2 therefore giving a single side band phase noise degradation of -6 dBc/Hz. Also it is important to note the tuning sensitivity will increase by a factor of N, where N is the multiplier factor. In this case, the tuning sensitivity will changed from 60 MHz/V, average, to 120 MHz/V, average.

Utilizing Z-COMM VCOs along with a multiplier, one can realize a low cost, high performance wide band frequency range VCO solution.

For additional information refer to the followig Z-COMM applications notes:

AN-101 Mounting and Ground of Z-COMM VCO
AN-102 Proper Loading of Z-COMM Voltage Controlled Ocillators

MANUAL SOLDERING TECHNIQUE FOR Z-COMM P-PACKAGE VOLTAGE CONTROLLED OSCILLATORS

This note describes common manufacturing methods used to solder Z-COMM pin mount VCOs. Following are suggested practices to ensure optimum performance and repeated product reliability.

Z-COMM pin mount VCOs pins are solder internally using SN 63 solder. During installation, special care should be taken not to over heat the contact pins as this will cause an upward movement into the VCO. This displacement will cause problems associated with inadequate grounding and/or loading isolation.

To ensure proper installation, a few simple techniques need to be implemented. Contact pins should be bent and trimmed upon installation (see Figure 1). The solder iron should be set for 250°C and should not make contact for longer than 5 seconds. SN 63 solder should be used for installation. Also, the underside of the VCO must maintain intimate contact with the system PCB.

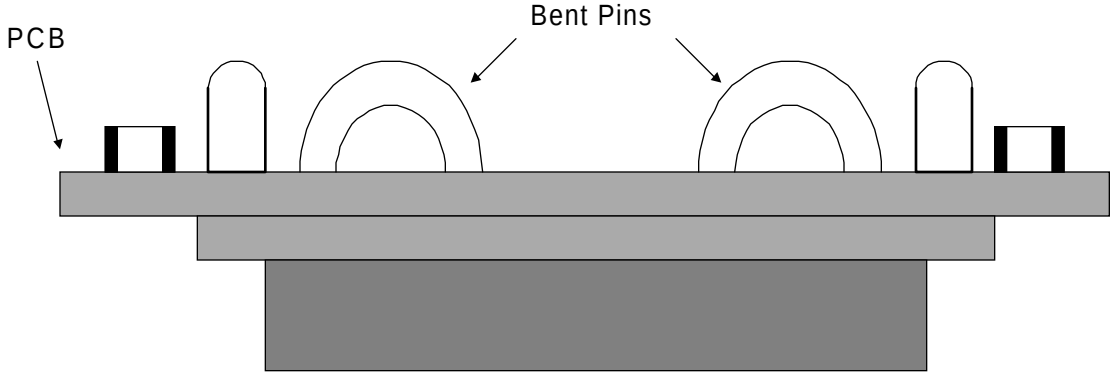


Figure 1

For additional information refer to the following Z-COMM application notes:

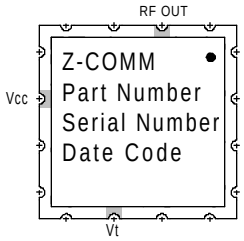
AN-100 Mounting and Grounding of Leaded Z-COMM VCOs
AN-102 Proper Output Leading of Z-COMM VCOs

LABEL ORIENTATION AND TAPE PLACEMENT OF Z-COMM VCOs

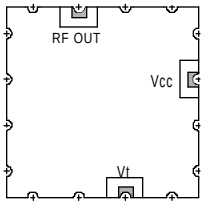
The proper orientation of Z-COMM VCOs can be determined by a reference marker placed on the label of the VCO. This application note shows where the placement of the marker is located on surface mount and leaded packaged devices. Also, it demostrates the placement of the SUB and MINI package into tape and reel packaging.

The orientation marker is positioned in the upper right hand corner of the VCO label. This indicates the referencing mark for the location of the RF output, tuning voltage, and supply voltage ports. This is standard labeling for all Z-COMM VCO package styles.

figure 1: Orientation Label Marking: SUB, MINI, and S Package

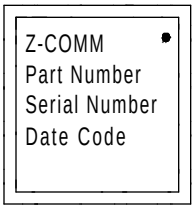


Top View

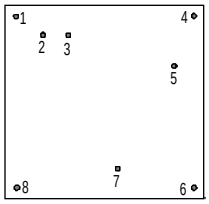


Bottom View

figure 2: Orientation Label Marking: P Package



Top View



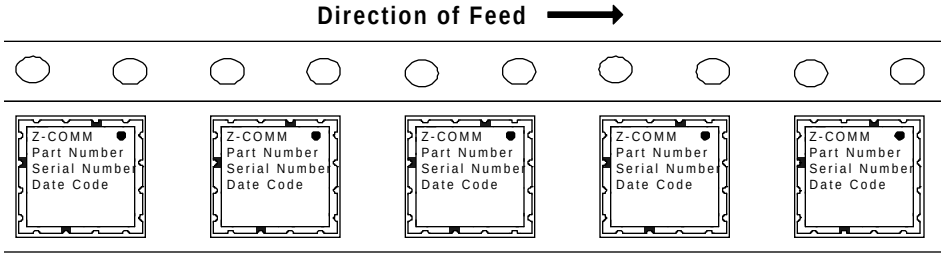
Bottom View

PIN CONNECTIONS

RF OUT	**3**
Vcc	**5**
Vt	**7**
GND	**1,2,4,6,8**

Z-COMM SUB and MINI package VCOs are available in carrier tape. These devices are placed in the embosed cavity of the tape and positioned as shown in figure 3. This illustration should assist in the setup of assembly equipment to correctly pick and place Z-COMM VCOs onto printed circuit boards.

figure 3: Tape Placement



Top View

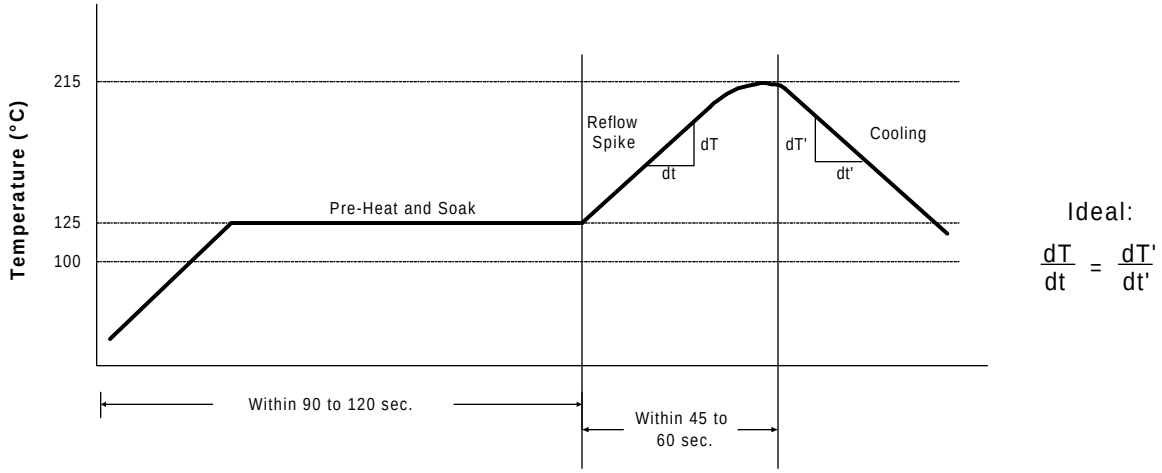
Note: SUB and MINI package carrier tape conforms to EIA-481-2 standard.

USING CONVECTION OVENS FOR ATTACHING Z-COMM VCOs

The use of convection ovens for reflowing can be employed with Z-COMM surface mount voltage controlled oscillators. This application note describes the suggested time-temperature reflow profile for the proper attachment of Z-COMM VCOs to printed circuit boards utilizing convection oven techniques.

The convection oven reflow process involves careful setup to optimally shape the heating zones and for applying a controlled amount of solder, flux and heat to the areas where connections are to be made. By following the suggested time and temperature profile, as illustrated in figure 1, the occurrence of solder bridging and poor solder joints can be minimized.

figure 1: Convection Oven Time-Temperature Reflow Profile



A pre-heat and soaking stage is needed at approximately 125°C for 90 to 120 seconds to reduce metal oxides. After this stage, the temperature should increase to 215°C to allow for good wetting to transpire. This should be followed by a cooling stage which should have roughly the same time-temperature rate of change as the reflow spike stage. It is recommended not to exceed the stated temperature during the reflow process to assure that excessive heat does not damage the VCO.

Although this is a suggested reflow profile, it will vary from application to application. As a result, it is suggested that independent reflow profile exercises be conducted to optimize VCO attachment. Utilizing the proper time, temperature, and heating zones during the reflow process will result in the solid and reliable solder connection of a Z-COMM VCO to the PCB.

Note: The suggested reflow profile assumes the use of SN63 solder paste onto an FR-4 substrate.

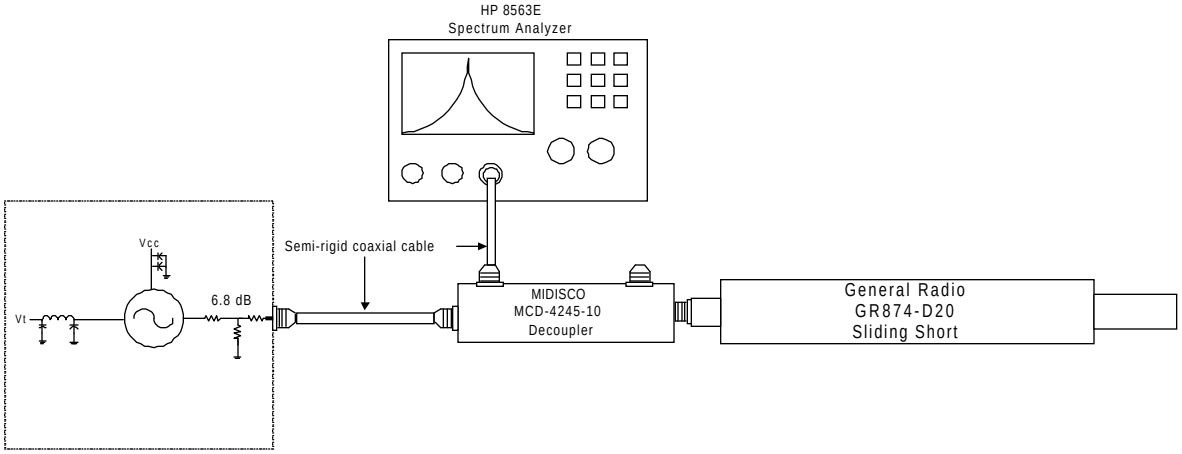
For additional information for soldering Z-COMM VCOs refer to the following application note:
AN-107 Manual Soldering Technique for Z-COMM VCOs

PULLING MEASUREMENT OF Z-COMM VCOs

The pulling response of Z-COMM VCOs is directly affected by improper matching and insufficient isolation. The frequency variation due to load mismatching is defined as pulling. Measured pulling performance of Z-COMM VCOs can be verified using the pulling test setup and procedure described in the following.

The pulling response of Z-COMM VCOs is measured with a sliding short having a typical VSWR of 1.7:1 or 14 dB return loss. The sliding short is rotated 0 to 2π so the load undergoes a complete phase change. Figure 1 shows the standard test setup for measuring the pulling performance of the VCOs.

figure 1: Test Setup for Measuring Pulling Performance



Procedure:

1. Adjust the sliding short tuning stub such that the output of the VCO is matched to a 50 ohm load.

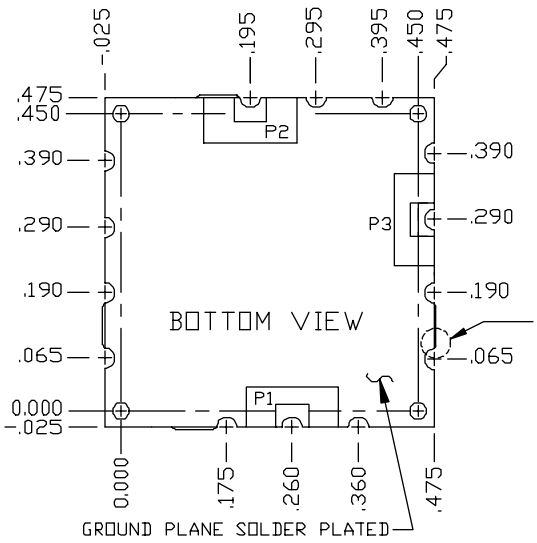
2. Set the VCO to its proper supply and tuning voltages noting the decoupling capacitors to remove any RF leakage.

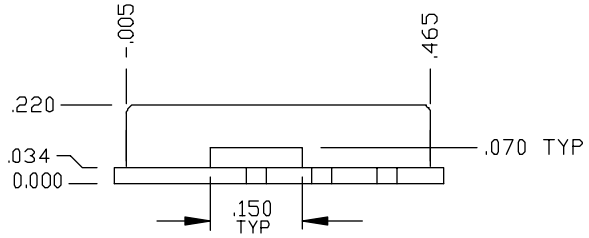
3. Center the output frequency in the middle of the analyzer and set the frequency span to twice the specified pulling value of the VCO.

4. Pull the sliding short so that a load mismatch occurs. The sliding short should be adjusted so the load undergoes a complete 0 to 2π phase change. Measure the difference between the maximum and mimimum frequency. This is the pulling specification.

5. Pulling performance may vary in the operating frequency band so it is recommended to measure the response at several different frequencies within the specified bandwidth.

For additional information regarding load matching refer to the following application note:
AN-102 Proper Output Loading of Z-COMM VCOs





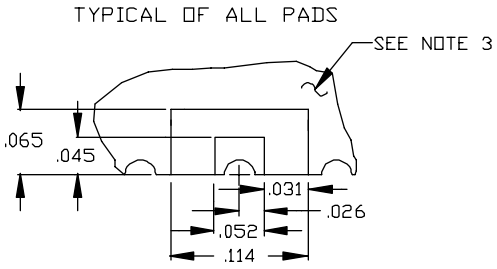
NOTES:

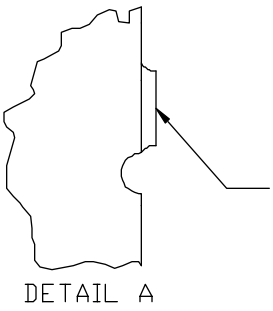
1. THE INSIDE RADIUS OF ALL 14 HALF HOLES AT THE PERIMETER OF THE BOARD ARE SOLDER PLATED TO PROVIDE A SURFACE FOR THE ATTACHMENT OF THE VCO TO A MOTHERBOARD, IN 11 LOCATIONS, WITH 3 PADS BEING USED FOR ELECTROMECHANICAL INTERFACE. 14 SOLDER LOCATIONS REQUIRED.
2. THE SURFACE OF THE SHIELD IS TIN PLATED AND MAY BE SOLDERED TO. THE SHIELDS BASE METAL IS BRASS.
3. THE GROUND PLANE IS GROUND AND ATTACHES TO A GROUND TRACK ON THE UPPER SIDE OF THE BOARD AS WELL AS THE SHIELD BY PTH.
4. UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES.
5. UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS FOLLOWS:

   TOLERANCES

   .XXX= ± .010

P1=VT
P2=RF OUT
P3=Vcc





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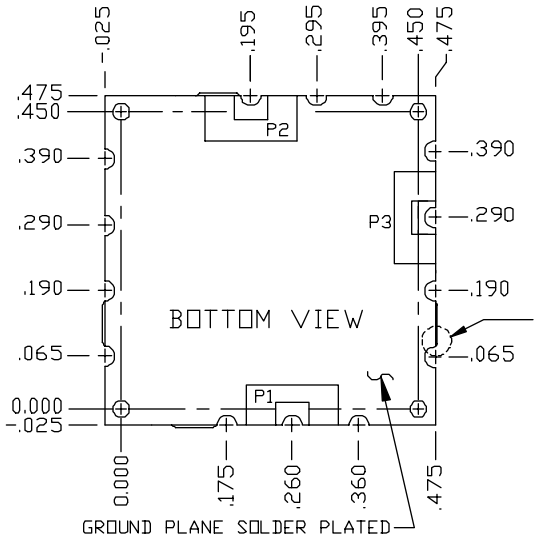

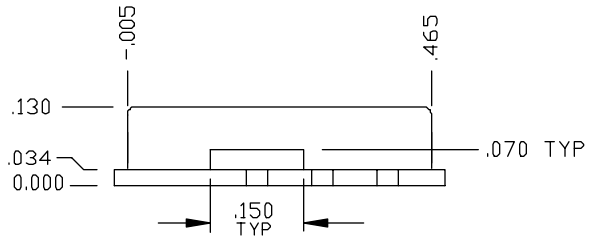

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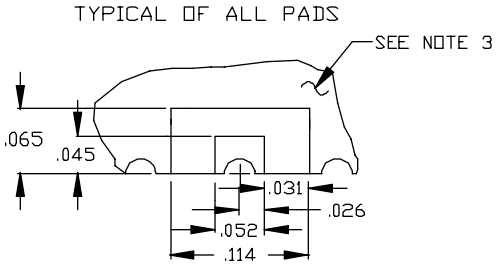
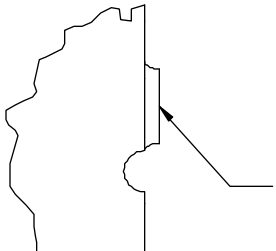
2. THE SURFACE OF THE SHIELD IS TIN PLATED AND MAY BE SOLDERED TO. THE SHIELDS BASE METAL IS BRASS.
3. THE GROUND PLANE IS GROUND AND ATTACHES TO A GROUND TRACK ON THE UPPER SIDE OF THE BOARD AS WELL AS THE SHIELD BY PTH.
4. UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES.
5. UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS FOLLOWS:

TOLERANCES
.XXX= ± .010

P1=VT
P2=RF OUT
P3=Vcc





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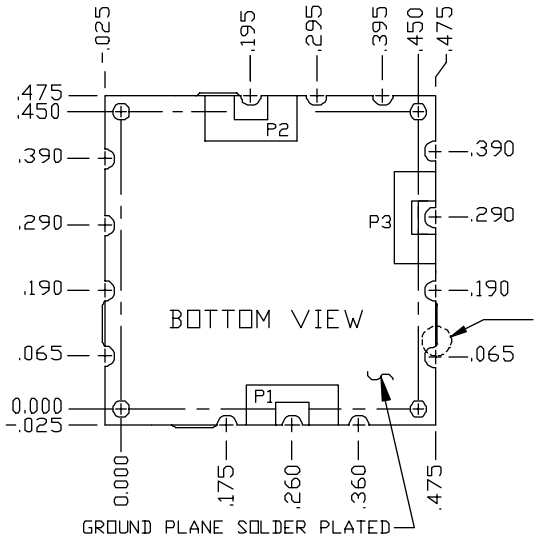

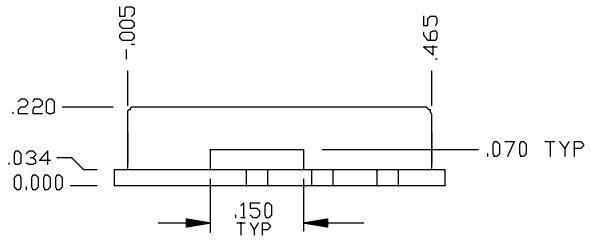

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TOLERANCES
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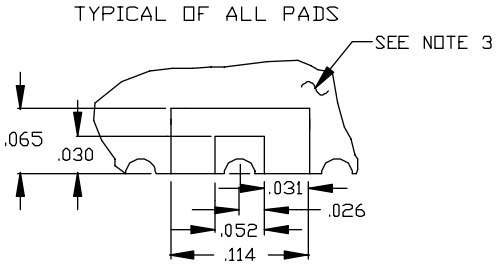

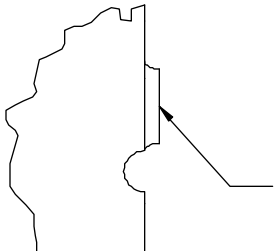

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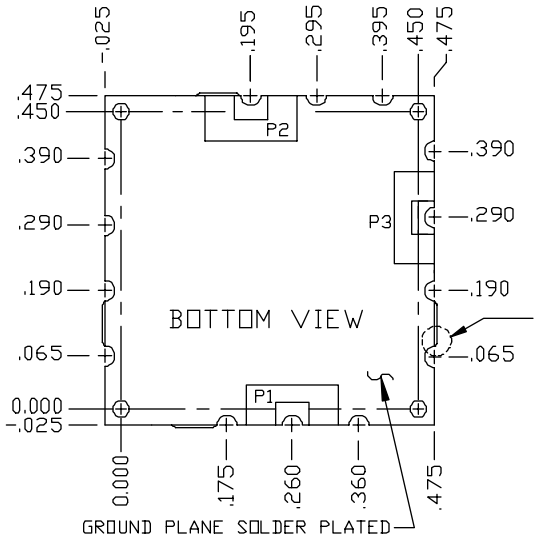

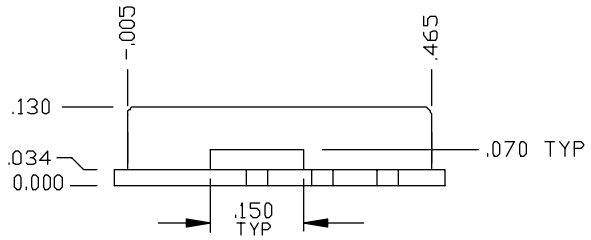

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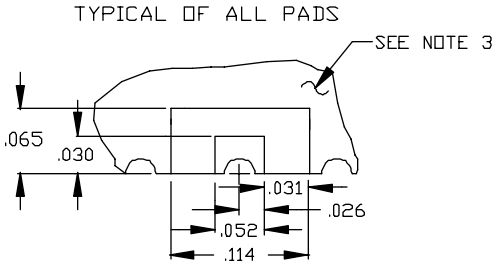
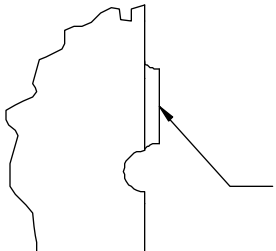
TOLERANCES
.XXX= ? .010

P1=VT
P2=RF OUT
P3=Vcc





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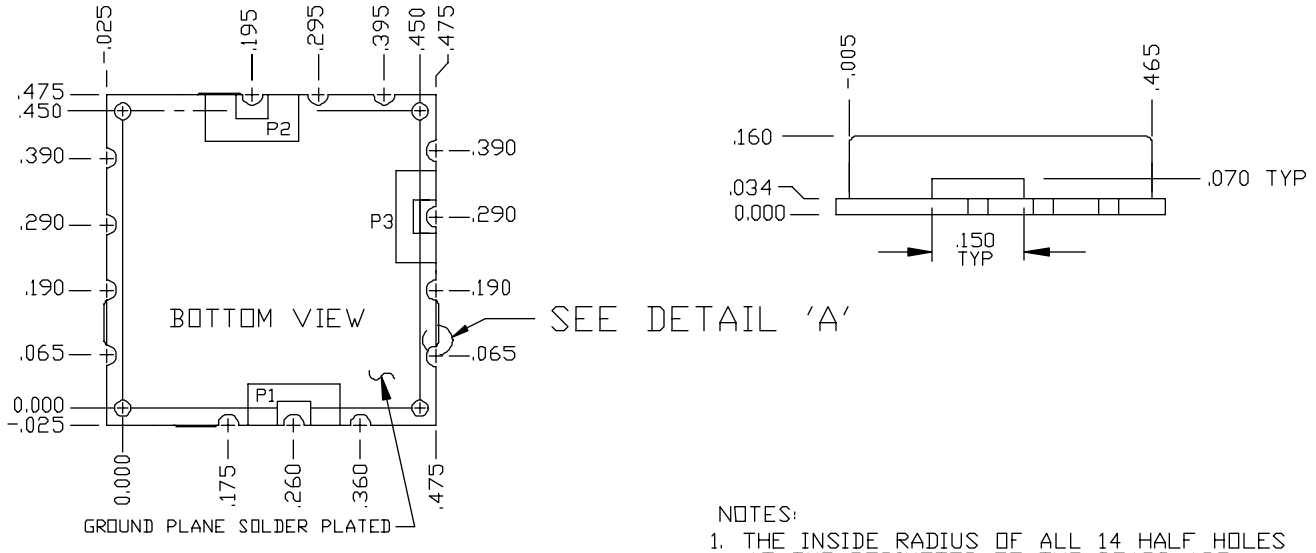

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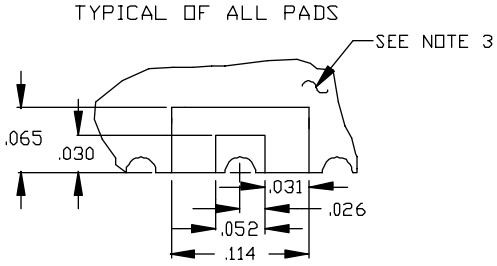
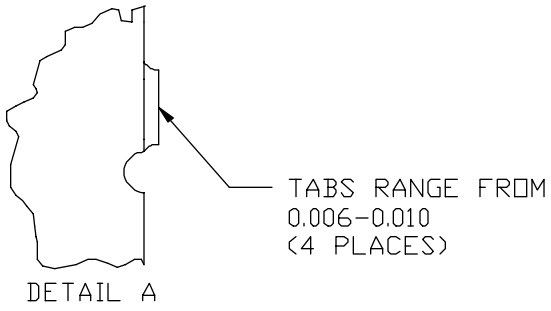
TOLERANCES
.XXX= ± .010

P1=VT
P2=RF OUT
P3=Vcc





DATE	REV	DESCRIPTION	BY
03-27-97	B	ECO# 97-0052	B.J.
6-20-96	A	ECO# 96-0105	D.A.R.

RELEASED BY:

NEXT ASSEMBLY:
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-
-

SURFACE COATING:
-
-
-

MATERIAL:
-
-
-

Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

PART NAME:
OUTLINE,MINI-14S LOW

DISK/DRIVE LTR: FILE NAME:
XXX

DRAWN: BILL J.

DATE: 03-27-97

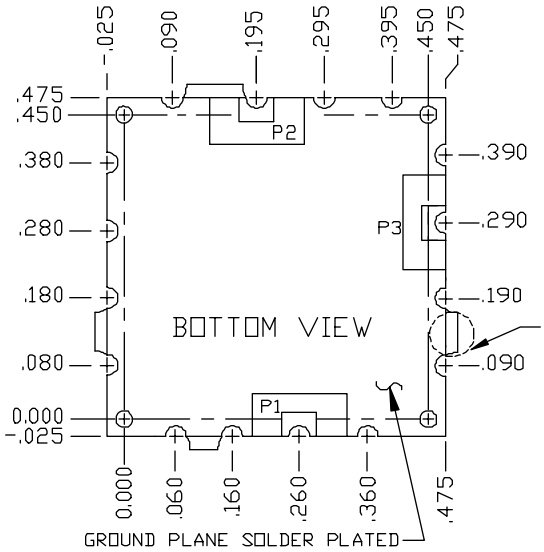
SCALE: NTS

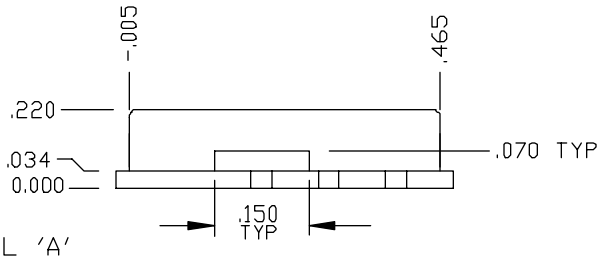
FILE LOCATION
_

SHEET NO.: 1 OF 1

DRAWING NO.: 415-0067

REV.: B



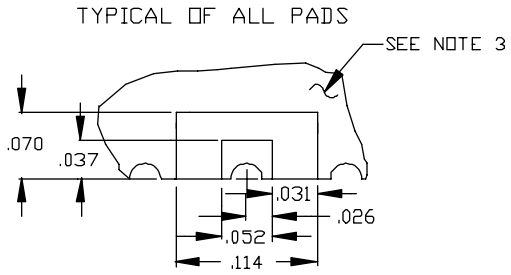


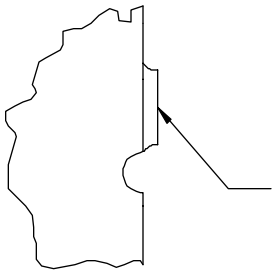
NOTES:

1. THE INSIDE RADIUS OF ALL 16 HALF HOLES AT THE PERIMETER OF THE BOARD ARE SOLDER PLATED TO PROVIDE A SURFACE FOR THE ATTACHMENT OF THE VCO TO A MOTHERBOARD, IN 13 LOCATIONS, WITH 3 PADS BEING USED FOR ELECTROMECHANICAL INTERFACE. 16 SOLDER LOCATIONS REQUIRED.
2. THE SURFACE OF THE SHIELD IS TIN PLATED AND MAY BE SOLDERED TO. THE SHIELDS BASE METAL IS BRASS.
3. THE GROUND PLANE IS GROUND AND ATTACHES TO A GROUND TRACK ON THE UPPER SIDE OF THE BOARD AS WELL AS THE SHIELD BY PTH.
4. UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES.
5. UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS FOLLOWS:

   TOLERANCES
   .XXX= ± .010

P1=VT
P2=RF OUT
P3=Vcc





TABS RANGE FROM
0.006 - 0.010
(4 PLACES)

DETAIL A

9-27-96	B	96-0197	

RELEASED BY:

Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

NEXT ASSEMBLY:

PART NAME:

MINI-16

SURFACE COATING:

DISK/DRIVE LTR: FILE NAME:
H:\ENG\DBASEENG\OUTLINE\415-0061.DWG

DRAWN: D. ROQUE

DATE: 9-27-96

SCALE: NONE

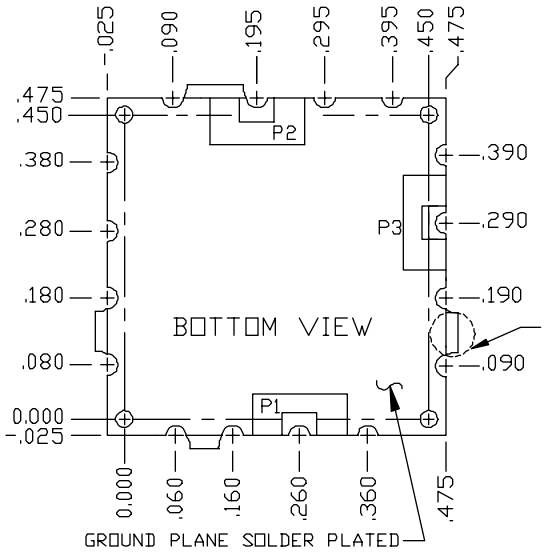
MATERIAL:

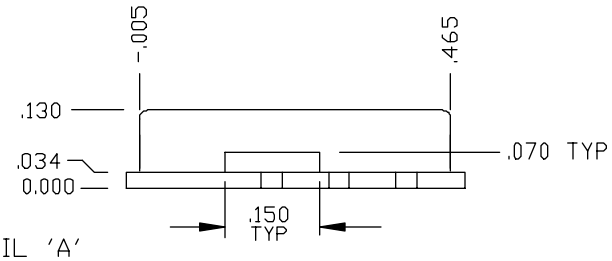
FILE LOCATION
—

SHEET NO.: 1 OF 1

DRAWING NO.: 415-0061

REV.: B



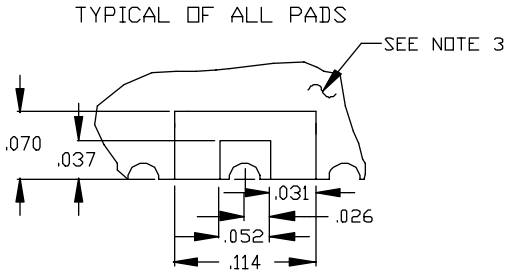


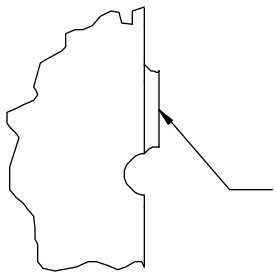
NOTES:

1. THE INSIDE RADIUS OF ALL 16 HALF HOLES AT THE PERIMETER OF THE BOARD ARE SOLDER PLATED TO PROVIDE A SURFACE FOR THE ATTACHMENT OF THE VCO TO A MOTHERBOARD, IN 13 LOCATIONS, WITH 3 PADS BEING USED FOR ELECTROMECHANICAL INTERFACE. 16 SOLDER LOCATIONS REQUIRED.
2. THE SURFACE OF THE SHIELD IS TIN PLATED AND MAY BE SOLDERED TO. THE SHIELDS BASE METAL IS BRASS.
3. THE GROUND PLANE IS GROUND AND ATTACHES TO A GROUND TRACK ON THE UPPER SIDE OF THE BOARD AS WELL AS THE SHIELD BY PTH.
4. UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES.
5. UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS FOLLOWS:

TOLERANCES
.XXX= ? .010

P1=VT
P2=RF OUT
P3=Vcc





9-27-96	B	96-0197	

RELEASED BY:

NEXT ASSEMBLY:
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-
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SURFACE COATING:
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MATERIAL:
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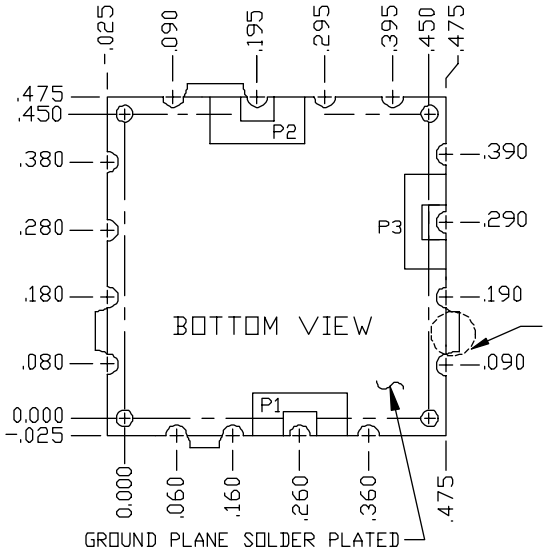
Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

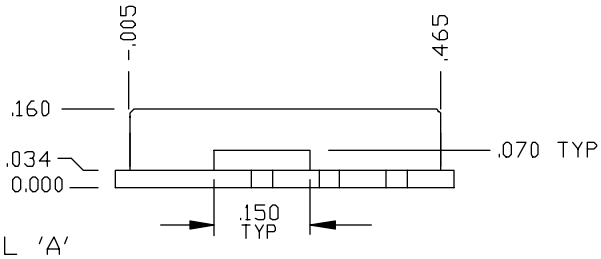
PART NAME:

MINI-16-L

DISK/DRIVE LTR: FILE NAME:	DRAWN:	DATE:	SCALE:
H:\ENG\DBASEENG\OUTLINE\415-0064.DWG	D. ROQUE	9-27-96	NONE

FILE LOCATION	SHEET NO.:	DRAWING NO.:	REV.:
_	1 OF 1	415-0064	B





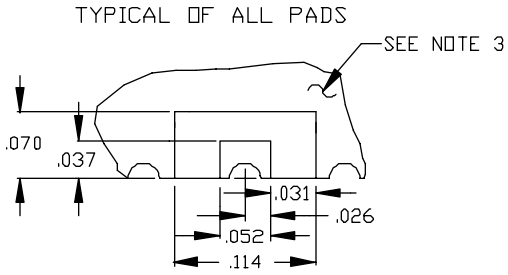
NOTES:

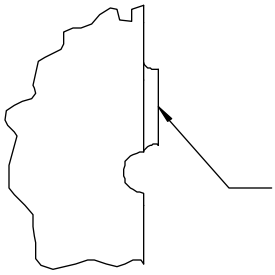
1. THE INSIDE RADIUS OF ALL 16 HALF HOLES AT THE PERIMETER OF THE BOARD ARE SOLDER PLATED TO PROVIDE A SURFACE FOR THE ATTACHMENT OF THE VCO TO A MOTHERBOARD, IN 13 LOCATIONS, WITH 3 PADS BEING USED FOR ELECTROMECHANICAL INTERFACE. 16 SOLDER LOCATIONS REQUIRED.
2. THE SURFACE OF THE SHIELD IS TIN PLATED AND MAY BE SOLDERED TO. THE SHIELDS BASE METAL IS BRASS.
3. THE GROUND PLANE IS GROUND AND ATTACHES TO A GROUND TRACK ON THE UPPER SIDE OF THE BOARD AS WELL AS THE SHIELD BY PTH.
4. UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES.
5. UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS FOLLOWS:

   TOLERANCES

   .XXX= ? .010

P1=VT
P2=RF OUT
P3=Vcc





12-3-96	A	INITIAL RELEASE	

RELEASED BY:

Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

NEXT ASSEMBLY:
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-

PART NAME:

OUTLINE, MINI 16 LOW

SURFACE COATING:
-
-
-

DISK/DRIVE LTR. FILE NAME:
H:\ENG\DBASEENG\OUTLINE\415-0068.DWG

DRAWN: D. ROQUE

DATE: 12-3-96

SCALE: NONE

MATERIAL:
-
-
-

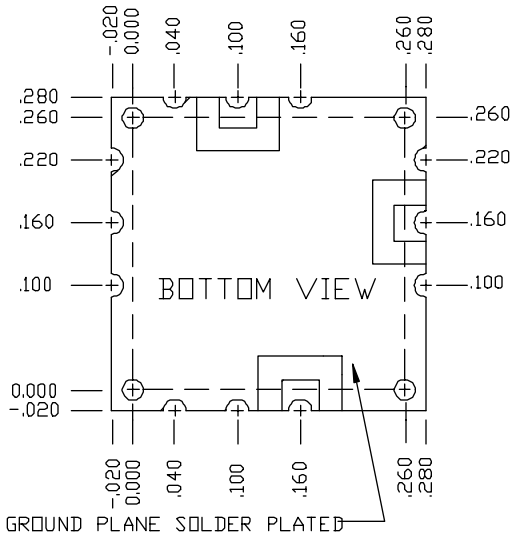
FILE LOCATION
_

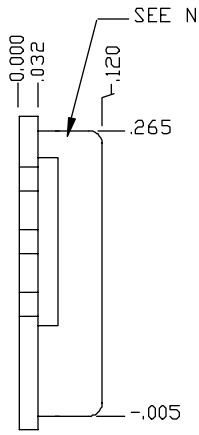
SHEET NO.: 1 OF 1

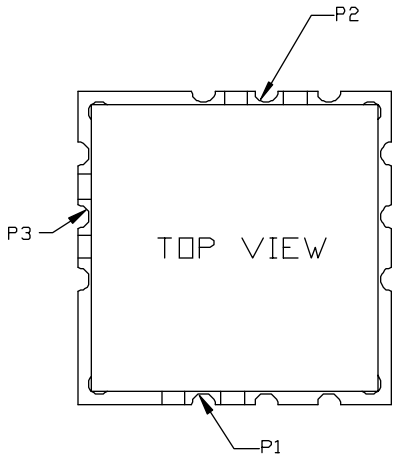
DRAWING NO.: 415-0068

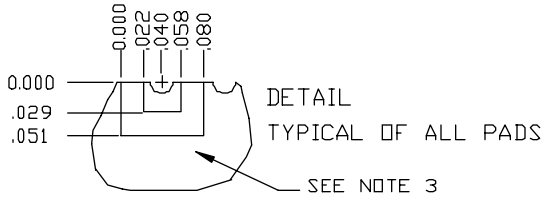
REV.: A

415-0045
REV C









NOTES:

1. THE INSIDE RADIUS OF ALL 12 HALF HOLES AT THE PERIMETER OF THE BOARD ARE SOLDER PLATED TO PROVIDE A SURFACE FOR THE ATTACHMENT OF THE VCO TO THE MOTHERBOARD.
2. THE SHIELD MATERIAL IS NICKEL SILVER AND MAY BE SOLDERED ALSO.
3. THE GROUND PLANE IS GROUND AND ATTACHES TO THE GROUND TRACK ON THE UPPER SIDE OF THE BOARD AS WELL AS THE SHIELD BY PTH.

TOLERENCES UNLESS OTHERWISE NOTED

.XXX ± .008

P1= VT
P2= RF OUT
P3= Vcc

2-27-96	C	CHANGE SHIELD MATERIAL
2-16-96	B	ECO 96-0017

RELEASED BY:

NEXT ASSEMBLY:
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SURFACE COATING:
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MATERIAL:
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Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

PART NAME:

SUB

DISK/DRIVE LTR: FILE NAME:
XXX

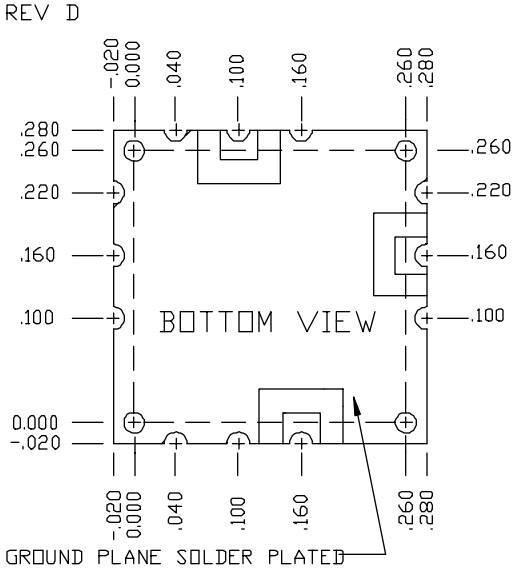
DRAWN: S. BOOZE
DATE: 2-9-96
SCALE: NONE

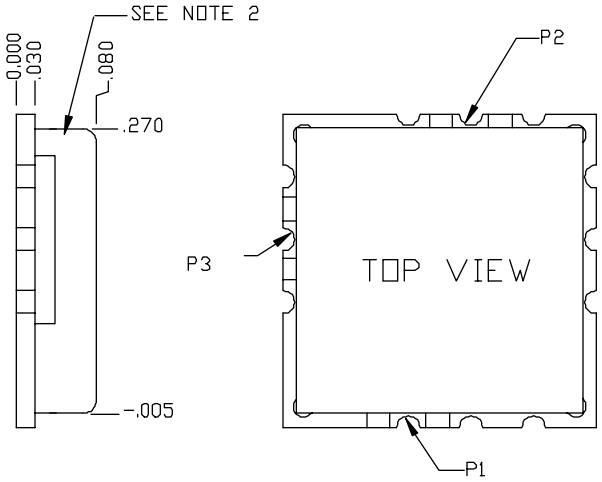
FILE LOCATION
_

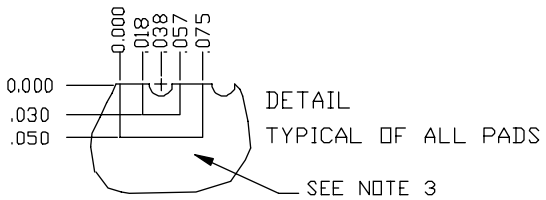
SHEET NO.: 1 OF 1

DRAWING NO.: 415-0045
REV.: C

415-0040
REV D







NOTES:

1. THE INSIDE RADIUS OF ALL 12 HALF HOLES AT THE PERIMETER OF THE BOARD ARE SOLDER PLATED TO PROVIDE A SURFACE FOR THE ATTACHMENT OF THE VCO TO THE MOTHERBOARD.
2. THE SHIELD MATERIAL IS NICKEL SILVER AND MAY BE SOLDERED ALSO.
3. THE GROUND PLANE IS GROUND AND ATTACHES TO THE GROUND TRACK ON THE UPPER SIDE OF THE BOARD AS WELL AS THE SHIELD BY PTH.

TOLERENCES UNLESS OTHERWISE NOTED
.XXX ± .010

P1= VT
P2= RF OUT
P3= Vcc

07-08-97	D	CHANGE PAD DIMENSION	B.J.
2-27-96	C	CHANGE SHIELD MATERIAL	
2-16-96	B	ECO 96-0017	

RELEASED BY:

NEXT ASSEMBLY:
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SURFACE COATING:
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MATERIAL:
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Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

PART NAME:

SUB-L

DISK/DRIVE LTR. FILE NAME:
\DBASENG\OUTLINES\415-0040.DWG

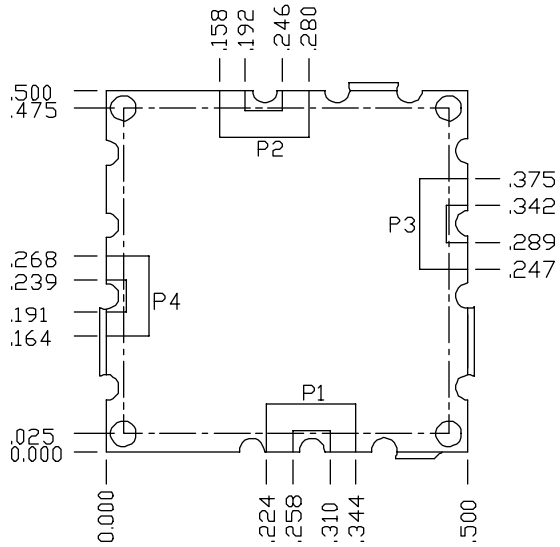
DRAWN: S. BOOZE
DATE: 2-9-96
SCALE: NONE

FILE LOCATION
—

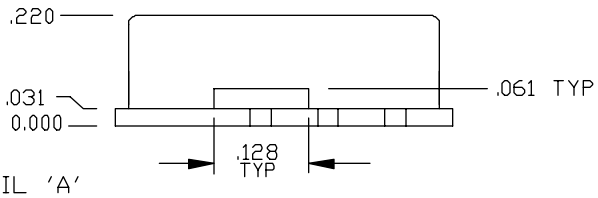
SHEET NO.: 1 OF 1

DRAWING NO.: 415-0040

REV.: D



BOTTOM VIEW



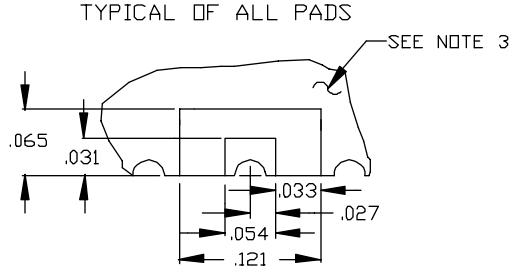
SEE DETAIL 'A'

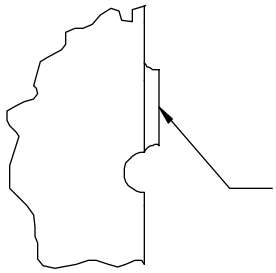
NOTES:

1. THE INSIDE RADIUS OF ALL 14 HALF HOLES AT THE PERIMETER OF THE BOARD ARE SOLDER PLATED TO PROVIDE A SURFACE FOR THE ATTACHMENT OF THE VCO TO A MOTHERBOARD, IN 10 LOCATIONS, WITH 4 PADS BEING USED FOR ELECTROMECHANICAL INTERFACE. 14 SOLDER LOCATIONS REQUIRED.
2. THE SURFACE OF THE SHIELD IS TIN PLATED AND MAY BE SOLDERED TO. THE SHIELDS BASE METAL IS BRASS.
3. THE GROUND PLANE IS GROUND AND ATTACHES TO A GROUND TRACK ON THE UPPER SIDE OF THE BOARD AS WELL AS THE SHIELD BY PTH.
4. UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES.
5. UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS FOLLOWS:

   TOLERANCES
   .XXX= ± .010

P1=VT
P2=RF OUT
P3=Vcc
P4=MOD INPUT (OPTIONAL)





TABS RANGE FROM
0.006 - 0.010
(4 PLACES)

DETAIL A

02-26-98	A	INITIAL RELEASE	B.J.

RELEASED BY:

NEXT ASSEMBLY:
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–

SURFACE COATING:
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–

MATERIAL:
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–
–

Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

PART NAME:

OUTLINE, MINI 14 MS

FILE LOCATION: H:\ENG\DBASEENG\OUTLINE\415-0073.DWG

DRAWN: BILL J.

DATE: 02-26-98

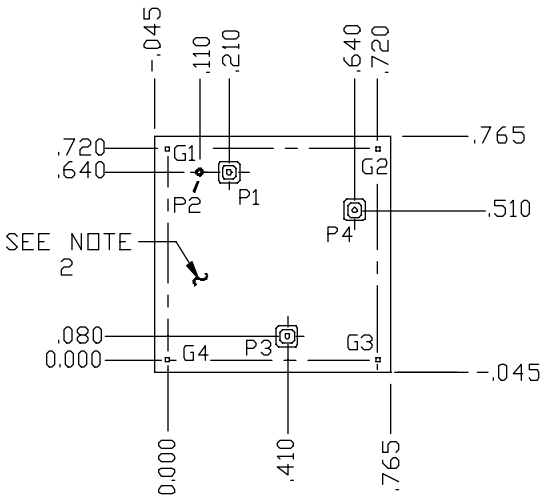
SCALE: NONE

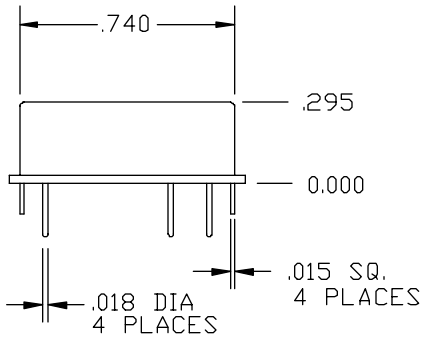
SHEET NO.: 1 OF 1

DRAWING NO.: 415-0073

REV.: A

P PACKAGE
REV C





NOTES:

1. SQUARE PINS G1 - G4, AND P2, ARE GROUND PINS WHICH ARE CONNECTED TO THE METAL CASE.
2. THIS AREA OF THE REAR OF THE ENCLOSURE IS SOLDER WETTED AND GROUNDED TO THE UPPER CASE.
3. METAL CASE IS COMPOSED OF BRIGHT TIN PLATED BRASS SHEET.
4. SOLDER FILLETS PRESENT ON CONTACT PINS.
5. GROUNDING PIN ARE SOLDERED WITH A LOW TEMP SOLDER. EXCESSIVE HEAT MAY CAUSE PINS TO FALL OUT.

TOLERANCE .XXX= ±.010
P1= RF OUT
P3= Vt
P4= Vcc

2-16-96	C	ECO 96-0017	

RELEASED BY:

NEXT ASSEMBLY:
-
-
-

SURFACE COATING:
-
-
-

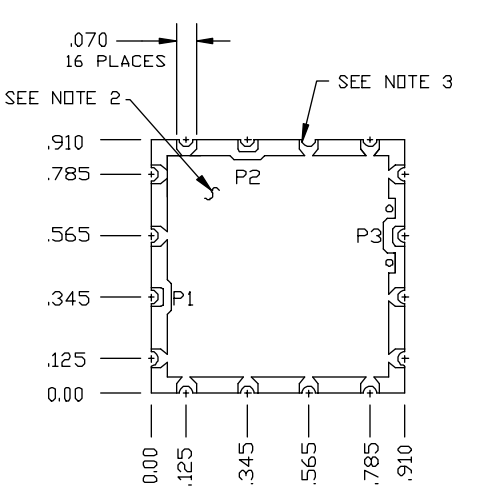
MATERIAL:
-
-
-

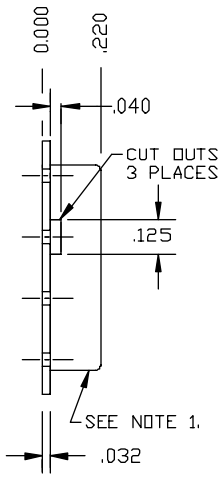
Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

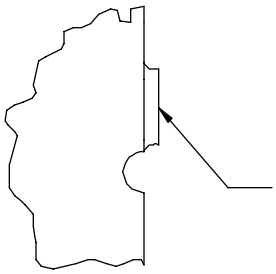
PART NAME:

OUTLINE, P PACKAGE

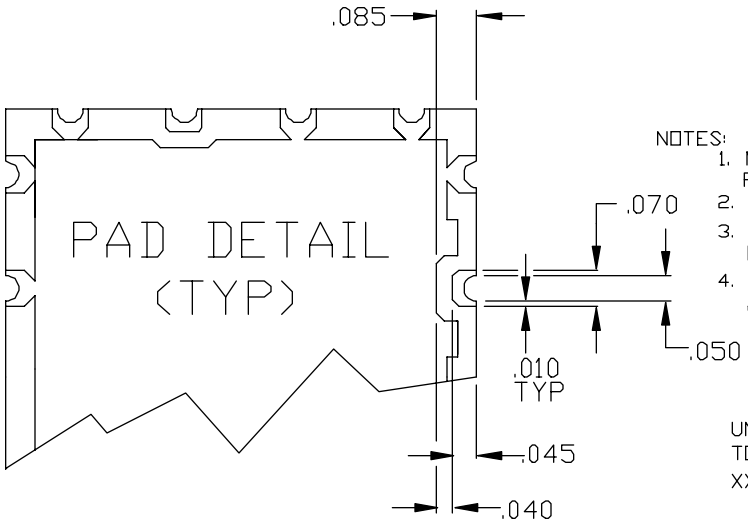
DISK/DRIVE LTR: FILE NAME: XXX	DRAWN: S. BOOZE	DATE: 2-9-96	SCALE: NONE
FILE LOCATION: -	SHEET NO.: 1 OF 1	DRAWING NO.: 415-0015	REV.: C







DETAIL A



NOTES:
1. METAL CASE IS GROUND AND IS COMPOSED OF TIN PLATED BRASS.
2. THIS AREA IS GROUND AND IS SOLDER WETTED
3. RADIAL SURFACES ARE PLATED THRU FROM THE PAD ON THE TOP SIDE TO THE PAD ON THE BOTTOM SIDE.
4. UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES.

UNLESS OTHERWISE NOTED
TOLERANCES ARE:
XXX= ±.010

P1=RF OUT
P2=Vcc
P3=Vt

10-31-96	E	ECO 96-0197	D.A.R.
8-28-96	D	ADD TOLERANCE TO CUT OUT ECO 96-0164	D.A.R.
3-29-96	C	ADD PAD DETAIL TO DRAWING	D.A.R.
2-16-96	B	ECO 96-0017	S.D.B.

RELEASED BY:

NEXT ASSEMBLY:
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-
-

SURFACE COATING:
-
-
-

MATERIAL:
-
-
-

Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

PART NAME:

OUTLINE, S PACKAGE

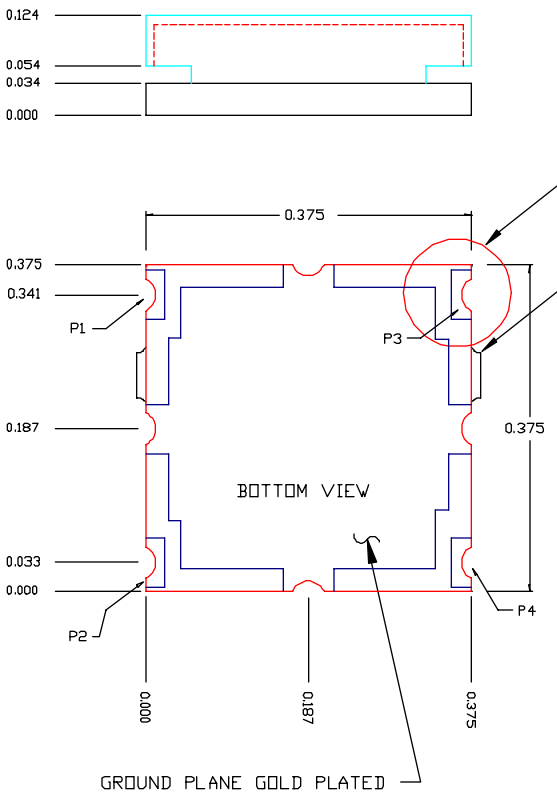
FILE LOCATION:
\DBASEENG\OUTLINE\415-0025.DWG

DRAWN: S. BOOZE
DATE: 2-9-96
SCALE: NONE

SHEET NO.: 1 OF 1

DRAWING NO.: 415-0025

REV.: E



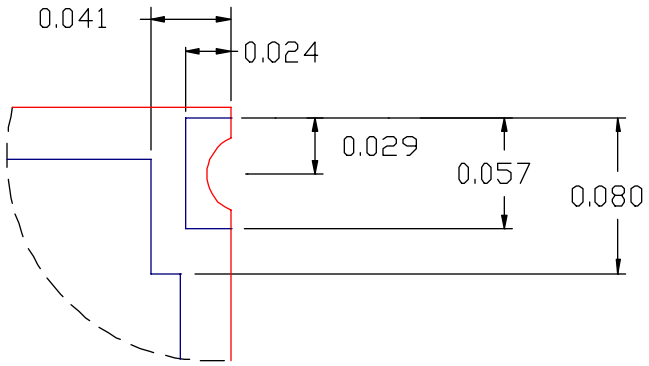
NOTES:

1. THE INSIDE RADIUS OF ALL 8 HALF HOLES AT THE PERIMETER OF THE BOARD ARE GOLD PLATED TO PROVIDE A SURFACE FOR THE ATTACHMENT OF THE VCO TO A MOTHERBOARD, IN 8 LOCATIONS, WITH 4 PADS BEING USED FOR ELECTROMECHANICAL INTERFACE. 8 SOLDER LOCATIONS REQUIRED.
2. THE SURFACE OF THE SHIELD IS TIN PLATED AND MAY BE SOLDERED TO. THE SHIELDS BASE METAL IS BRASS.
3. THE GROUND PLANE IS GROUND AND ATTACHES TO A GROUND TRACK ON THE UPPER SIDE OF THE BOARD AS WELL AS THE SHIELD BY PTH.
4. UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES.
5. UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS FOLLOWS:

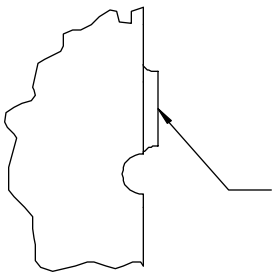
   TOLERANCES

   .XXX= ± .010

P1 = Vmod (Opt)
P2 = RF Out
P3 = V Tune
P4 = Vcc



DETAIL A (DIM TYP 4 PLACES)



TABS RANGE FROM
0.006 - 0.010
(2 PLACES)

DETAIL B

04-14-98	A	INITIAL RELEASE	B.J.

RELEASED BY:

NEXT ASSEMBLY:
-
-
-

SURFACE COATING:
-
-
-

MATERIAL:
-
-
-

Z-Communications
9939 VIA PASAR
SAN DIEGO, CALIFORNIA 92126

PART NAME:

OUTLINE, .375 VCO

FILE LOCATION:
\DBASEENG\OUTLINE\415-0074.DWG

DRAWN: BILL J.

DATE: 04-14-98

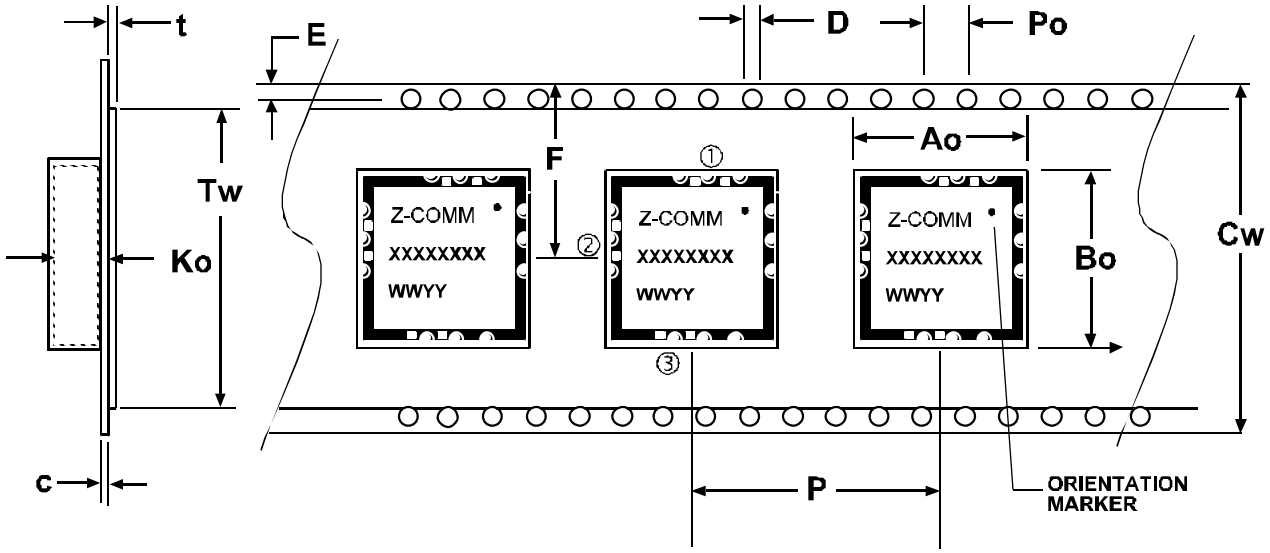
SCALE: NONE

SHEET NO.: 1 OF 1

DRAWING NO.: 415-0074

REV.: A

S PACKAGE TAPE DIMENSIONS AND PART ORIENTATION



TERMINAL	PORT NAME
1	RF OUTPUT
2	SUPPLY VOLTAGE
3	TUNING VOLTAGE
REMAINING	GROUND

WHERE:

XXXXXXXX IS THE Z-COMMUNICATIONS PART NUMBER
WWYY IS THE DATE CODE OF THE MANUFACTURE BY WORK WEEK (WW) AND YEAR (YY)

S PACKAGE TAPE DIMENSIONS (ALL DIMENSIONS IN INCHES)

PACKAGE NUMBER	ITEMS	SYMBOL	SIZE
POCKET	LENGTH	Ao	1.007
	WIDTH	Bo	1.007
	DEPTH	Ko	0.211
	PITCH	P	1.247
PERFORATION	DIAMETER	D	0.060
	PITCH	Po	0.160
	POSITION	E	0.070
DISTANCE BETWEEN CENTERLINES	WIDTH	F	0.864
COVER TAPE	WIDTH	Tw	1.471
	THICKNESS	t	0.0025
CARRIER TAPE	WIDTH	Cw	1.73
	THICKNESS	c	0.013

REVIEWED:

APPROVED:

RELEASE DATE:

Z-Communications, Inc.
9939 VIA PASAR
SAN DIEGO, CA 92126
http://www.zcomm.com/
sales@zcomm.com

PART NAME: **S PAGKAGE TAPE DIMENSIONS**

FILE LOCATION:

DRAWN: BILL J.

DATE: 07-14-98

SCALE: NONE

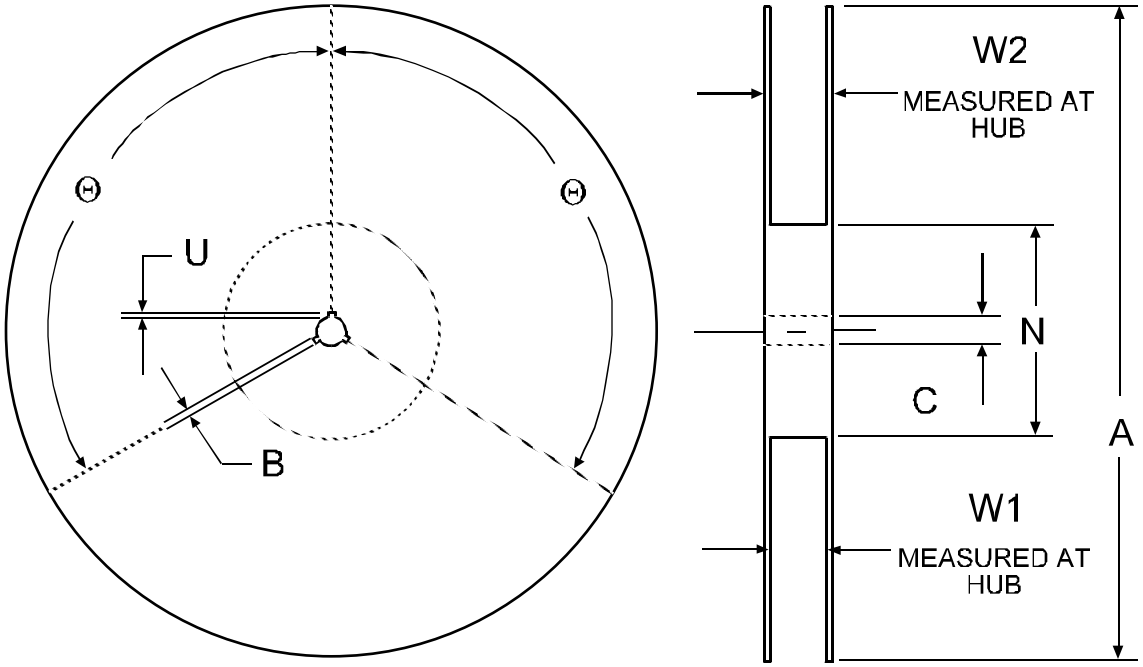
TOLERANCES: ±0.010 IN.

SHEET NO.: 1 OF 1

DRAWING NO.: **416-0006**

REV.: **A**

S PACKAGE REEL DIMENSIONS



S PACKAGE REEL DIMENSIONS (ALL DIMENSIONS IN INCHES)			
PACKAGE NUMBER	ITEMS	SYMBOL	SIZE
FLANGE	DIAMETER	A	13.0
	OVERALL THICKNESS AT HUB	W2	1.935
	SPACE BETWEEN FLANGES	W1	1.758
HUB	OUTER DIAMETER	N	4.55
	SPINDLE HOLE DIAMETER	C	0.518
	KEY SLIT WIDTH	B	0.083
	DEPTH	U	0.146
	POSITION	Θ	120º
NUMBER OF PIECES PER REEL		250	
NUMBER OF ORIENTATIONS AVAILABLE		1	

REVIEWED:

APPROVED:

RELEASE DATE:

Z-Communications, Inc.
9939 VIA PASAR
SAN DIEGO, CA 92126
http://www.zcomm.com/
sales@zcomm.com

PART NAME: **S PAGKAGE REEL DIMENSIONS**

FILE LOCATION:

DRAWN: BILL J.

DATE: 07-14-97

SCALE: NONE

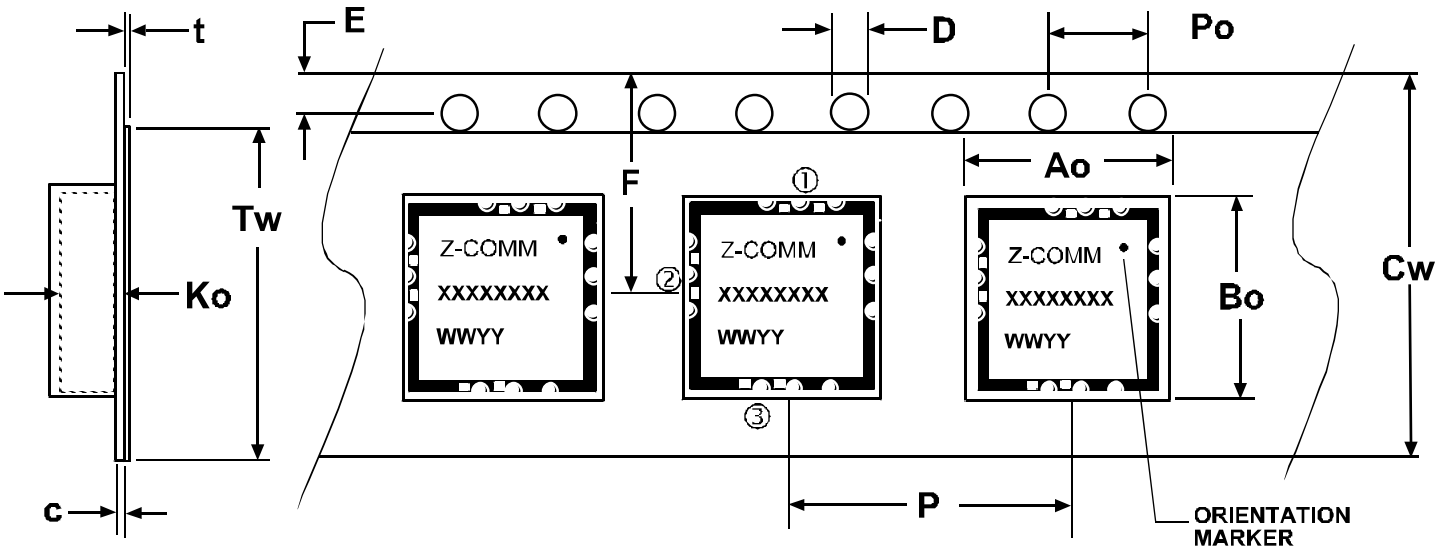
TOLERANCES: ±0.010 IN.

SHEET NO.: 1 OF 1

DRAWING NO.: **416-0007**

REV.: **A**

MINI PACKAGE TAPE DIMENSIONS AND PART ORIENTATION



TERMINAL	PORT NAME
1	RF OUTPUT
2	SUPPLY VOLTAGE
3	TUNING VOLTAGE
REMAINING	GROUND

WHERE:

XXXXXXXX IS THE Z-COMMUNICATIONS PART NUMBER
WWYY IS THE DATE CODE OF THE MANUFACTURE BY WORK WEEK (WW) AND YEAR (YY)

MINI PACKAGE TAPE DIMENSIONS (ALL DIMENSIONS IN INCHES)

PACKAGE NUMBER	ITEMS	SYMBOL	SIZE
POCKET	LENGTH	Ao	0.537
	WIDTH	Bo	0.537
	DEPTH	Ko	0.230
	PITCH	P	0.627
PERFORATION	DIAMETER	D	0.060
	PITCH	Po	0.160
	POSITION	E	0.070
DISTANCE BETWEEN CENTERLINES	WIDTH	F	0.530
COVER TAPE	WIDTH	Tw	0.847
	THICKNESS	t	0.0025
CARRIER TAPE	WIDTH	Cw	0.940
	THICKNESS	c	0.013

REVIEWED:

APPROVED:

RELEASE DATE:

Z-Communications, Inc.
9939 VIA PASAR
SAN DIEGO, CA 92126
http://www.zcomm.com/
sales@zcomm.com

PART NAME: **MINI PAGKAGE TAPE DIMENSIONS**

FILE LOCATION:

DRAWN:	DATE:	SCALE:
BILL J.	07-14-98	NONE

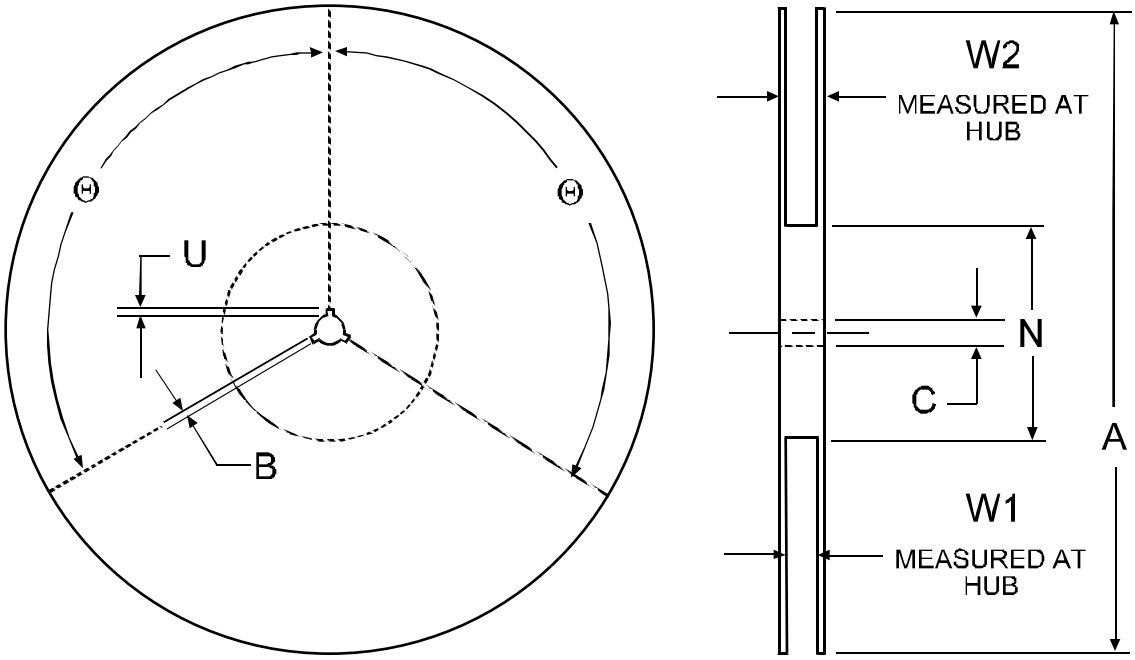
TOLERANCES: ±0.010 IN.

SHEET NO.: 1 OF 1

DRAWING NO.: **416-0004**

REV.: **A**

MINI PACKAGE REEL DIMENSIONS



MINI PACKAGE REEL DIMENSIONS (ALL DIMENSIONS IN INCHES)			
PACKAGE NUMBER	ITEMS	SYMBOL	SIZE
FLANGE	DIAMETER	A	13.0
	OVERALL THICKNESS AT HUB	W2	1.150
	SPACE BETWEEN FLANGES	W1	0.971
HUB	OUTER DIAMETER	N	4.30
	SPINDLE HOLE DIAMETER	C	0.518
	KEY SLIT WIDTH	B	0.083
	DEPTH	U	0.146
	POSITION	Θ	120º
NUMBER OF PIECES PER REEL		600	
NUMBER OF ORIENTATIONS AVAILABLE		1	

REVIEWED:

APPROVED:

RELEASE DATE:

Z-Communications, Inc.
9939 VIA PASAR
SAN DIEGO, CA 92126
http://www.zcomm.com/
sales@zcomm.com

PART NAME: **MINI PAGKAGE REEL DIMENSIONS**

FILE LOCATION:

DRAWN: BILL J.

DATE: 07-14-98

SCALE: NONE

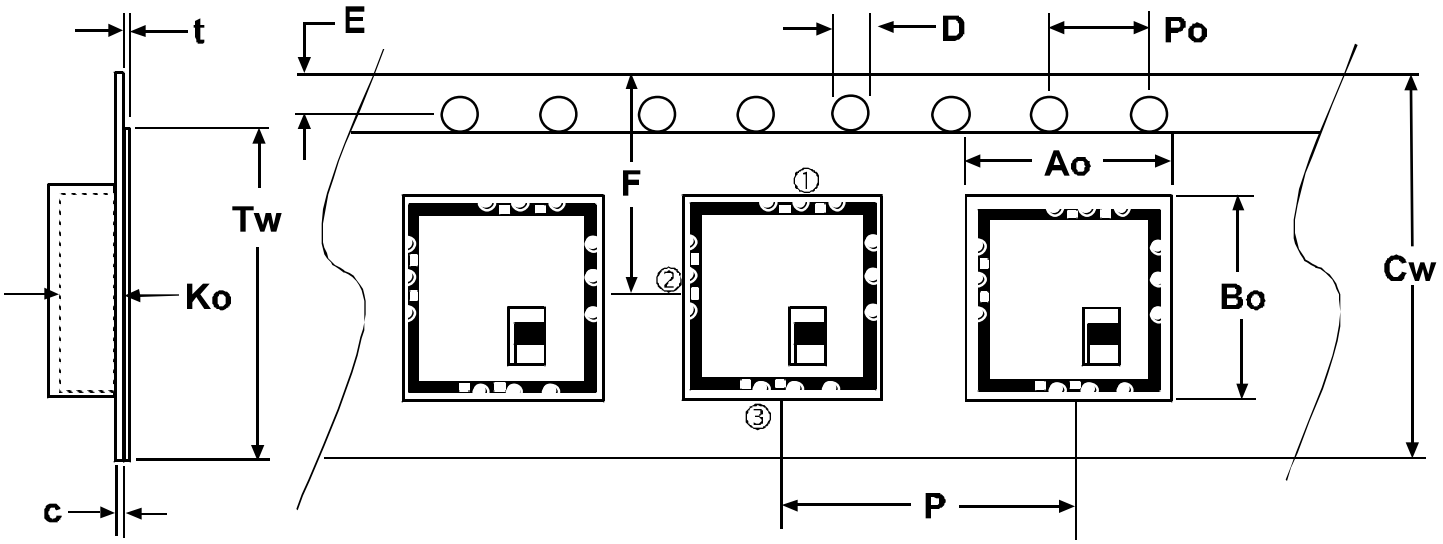
TOLERANCES: ±0.010 IN.

SHEET NO.: 1 OF 1

DRAWING NO.: **416-0005**

REV.: **A**

SMV PACKAGE TAPE DIMENSIONS AND PART ORIENTATION



TERMINAL	PORT NAME
1	RF OUTPUT
2	SUPPLY VOLTAGE
3	TUNING VOLTAGE
REMAINING	GROUND

SMV PACKAGE TAPE DIMENSIONS (ALL DIMENSIONS IN INCHES)			
PACKAGE NUMBER	ITEMS	SYMBOL	SIZE
POCKET	LENGTH	Ao	0.330
	WIDTH	Bo	0.330
	DEPTH	Ko	0.120
	PITCH	P	0.462
PERFORATION	DIAMETER	D	0.060
	PITCH	Po	0.160
	POSITION	E	0.070
DISTANCE BETWEEN CENTERLINES	WIDTH	F	0.364
COVER TAPE	WIDTH	Tw	0.531
	THICKNESS	t	0.0025
CARRIER TAPE	WIDTH	Cw	0.631
	THICKNESS	c	0.013

REVIEWED:

APPROVED:

RELEASE DATE:

Z-Communications, Inc.
9939 VIA PASAR
SAN DIEGO, CA 92126
http://www.zcomm.com/
sales@zcomm.com

PART NAME: **SMV-PAGKAGE TAPE DIMENSIONS**

FILE LOCATION:

DRAWN:	DATE:	SCALE:
BILL J.	06-29-97	NONE

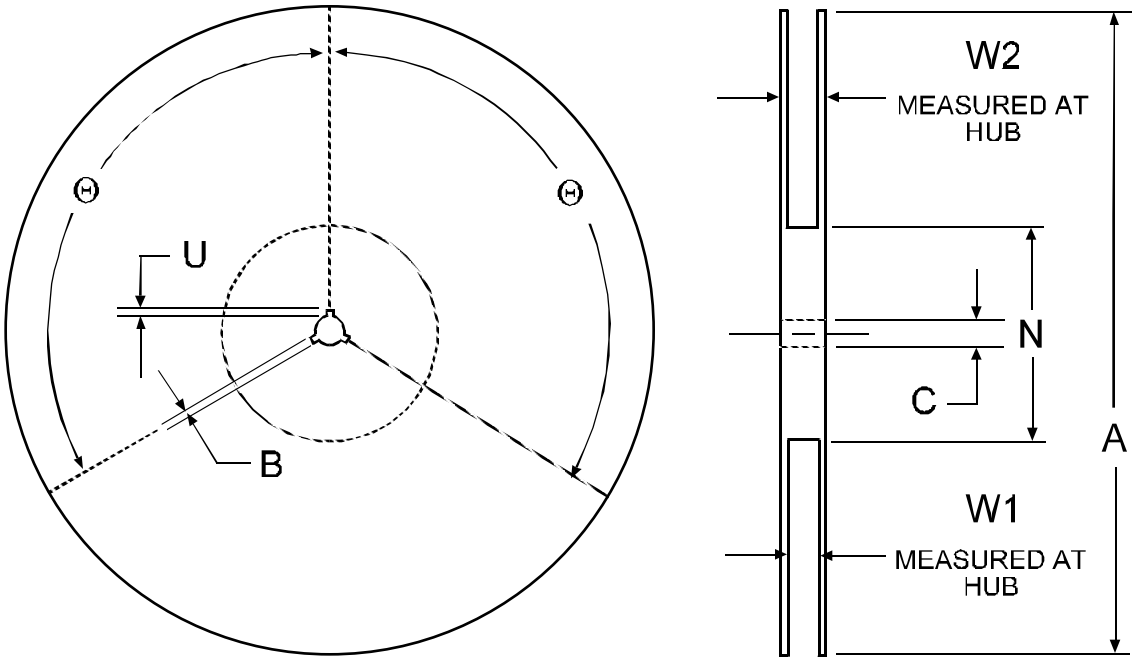
TOLERANCES: ±0.010 IN.

SHEET NO.: 1 OF 1

DRAWING NO.: **416-0001**

REV.: **A**

SMV PACKAGE REEL DIMENSIONS



SMV PACKAGE REEL DIMENSIONS (ALL DIMENSIONS IN INCHES)			
PACKAGE NUMBER	ITEMS	SYMBOL	SIZE
FLANGE	DIAMETER	A	13.0
	OVERALL THICKNESS AT HUB	W2	0.835
	SPACE BETWEEN FLANGES	W1	0.665
HUB	OUTER DIAMETER	N	4.30
	SPINDLE HOLE DIAMETER	C	0.518
	KEY SLIT WIDTH	B	0.083
	DEPTH	U	0.146
	POSITION	Θ	120º
NUMBER OF PIECES PER REEL		2000	
NUMBER OF ORIENTATIONS AVAILABLE		1	

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sales@zcomm.com

REVIEWED:

APPROVED:

RELEASE DATE:

PART NAME: **SMV-PAGKAGE REEL DIMENSIONS**

FILE LOCATION:

DRAWN: BILL J.

DATE: 06-29-97

SCALE: NONE

DRAWING NO.: **416-0002**

REV.: **A**

TOLERANCES: ±0.010 IN.

SHEET NO.: 1 OF 1

REEL LABELING SPECIFICATION

1. THIS DOCUMENT DEFINES THE REQUIREMENTS FOR LABELS THAT APPEAR ON REELS FOR HIGH VOLUME PRODUCTION ORDERS.

2. THE STANDARD LABEL SHALL CONSIST OF **Z-COMMUNICATIONS P/N** (PART NUMBER), **DATE CODE, QUANTITY, CUSTOMER,** AND **CUSTOMER PO** (PURCHASE ORDER), WHERE:

Z-COMMUNICATIONS P/N IS AN ALPHANUMERIC CODE (8 CHARACTERS IN LENGTH) ASSIGNED TO EACH PRODUCT MANUFACTURED BY THE COMPANY.

DATE CODE IS A NUMERIC CODE (4 CHARACTERS IN LENGTH AND DENOTED AS "WWYY" WHERE "WW" REPRESENTS THE MANUFACTURING WORK WEEK WHOSE VALUE LIES BETWEEN 01-52 AND "YY" REPRESENTS THE LAST TWO DIGITS OF THE MANUFACTURING WORK YEAR) INDICATING THE TIME THE PRODUCTS WERE MANUFACTURED.

QUANTITY IS A NUMERIC CODE REPRESENTING THE TOTAL NUMBER OF COMPONENTS PRESENT IN THE PARTICULAR REEL IN UNITS.

CUSTOMER IS AN ALPHANUMERIC CODE (UP TO 6 CHARACTERS IN LENGTH) THAT REPRESENTS THE CUSTOMER'S NAME.

CUSTOMER PO (PURCHASE ORDER) IS AN ALPHANUMERIC CODE (UP TO 10 CHARACTERS IN LENGTH) THAT DENOTES THE CUSTOMER'S PURCHASE ORDER NUMBER.

3. THE STANDARD LABEL, IN ADDITION TO THE HUMAN READABLE INFORMATION CITED ABOVE, SHALL ALSO INCLUDE BAR CODE LABELING FOR THE ABOVE DATA FOR AUTOMATED READABILITY. THE CODING SCHEME USED SHALL BE DESIGNATED AS "CODE 39" AS DEFINED BY PUBLIC INDUSTRIAL MARKING STANDARDS AS OF JUNE, 1997.

4. THE LABEL USED SHALL NOT EXCEED 4" X 2.57" IN DIMENSION AND SHALL INCLUDE THE COMPANY'S CORPORATE CONTACT INFORMATION. PREFERRED LABEL IS AVERY K-5522.

5. ALL INFORMATION CITED IN PARAGRAPHS 1-4 SHALL APPEAR IN SIMILAR FASHION TO THE LABEL REPRESENTED BELOW:

REFERENCE DOCUMENTS:
416-0001 AND 416-0002

REVIEWED:	Z-Communications, Inc. 9939 VIA PASAR SAN DIEGO, CA 92126 http://www.zcomm.com/ sales@zcomm.com			
APPROVED:	PART NAME: **REEL LABELING SPECIFICATION**			
RELEASE DATE:	FILE LOCATION:	DRAWN: BILL J.	DATE: 07-14-98	SCALE: NONE
	TOLERANCES: ±0.010 IN.	SHEET NO.: 1 OF 1	DRAWING NO.: **416-0003**	REV.: **A**

Z-Communications, Inc.

ANT2450-10CR 10dB Right-Hand Circular Polarized Antenna

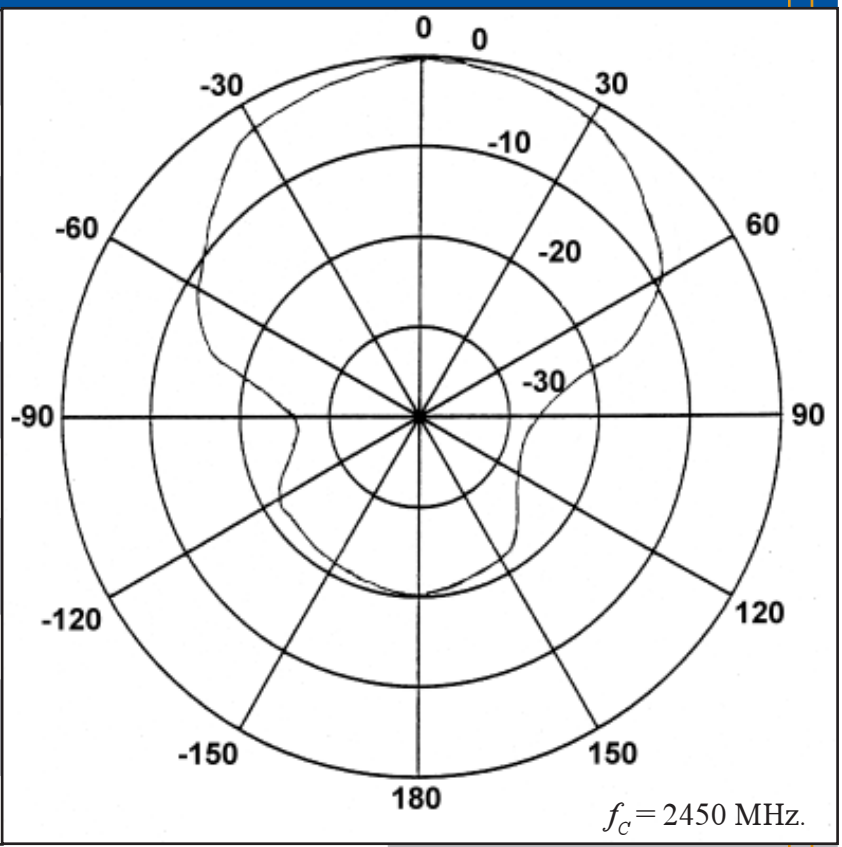
Features

Features:
- 10dB Right-Hand Circular Polarized antenna
- 2400-2500 MHz
- Beamwidth: 60º
- Front-to-back ratio: > 15dB

Applications:
- WLAN
- Point-to-point radios
- MMDS
- Bar code readers

Technical Specifications

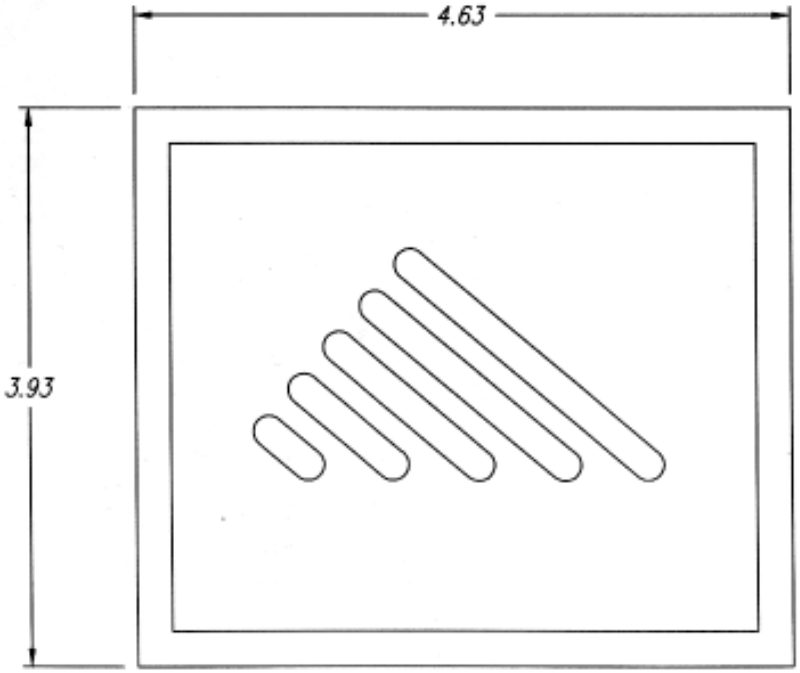
Freq. Range (MHz)	-3dB Beamwidth (E and H plane)
2400-2500	45º (min.), 60º (typ.)
Axial Ratio	**Gain (dBi)**
4 (max.)	8 (min.), 10 (typ.)
Weight (oz.)	**Front to Back (dB)**
4	> 15
Cross Polarization	
10 dB (min.)	
Bandwidth	
2450±75 MHz, 14 dB R.L. (typ.)	



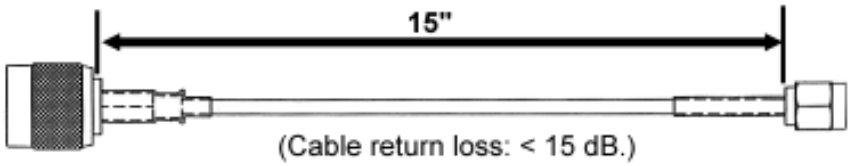
$f_C = 2450$ MHz.

Made in the USA. All specifications subject to change without notice.

Mechanical Dimensions

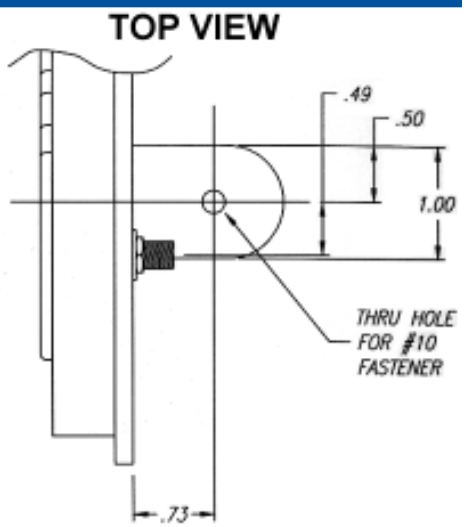


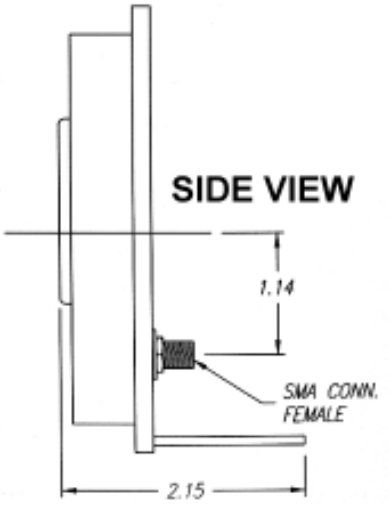
FRONT VIEW



(Cable return loss: < 15 dB.)

TNC-SMA CABLE





Mounting & Environmental Information

The ANT2450-10CR comes with an SMA-TNC cable. The ANT2450-10CR can be mounted to a wall with an "L-brace." Suggested source of supply for the L-brace is McMaster Carr, part number 15275A51. The ANT2450-10CR and L-brace can be secured with a #10 screw and nut.

The ANT2450-10CR cover is an ABS weatherproof material that lends itself to outdoor mounting. The backplate is composed of passivated aluminum with white powdercoat.

For more information contact:
Z-Communications, Inc.
9939 Via Pasar · San Diego, CA 92126
Phone: (858) 621-2700 · Fax: (858) 621-2722
http://www.zcomm.com/product_info/antenna/patch.html