MAINTENANCE MANUAL FOR 800 MHz TRANSMITTER SYNTHESIZER MODULE 19D902780G5

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DESCRIPTION

The principle function of the Transmitter Synthesizer Module is to provide the RF excitation for input to the MASTR III station power amplifier. The output of the synthesizer is a frequency modulated signal at the desired frequency. The module contains the following functional blocks:

- A voltage controlled oscillator.
- RF Buffer and Divide by 2 Prescaler.

- A chain of integrated circuit RF Amplifiers.
- A reference buffer amplifier.
- Dual modulus prescaler and synthesizer integrated circuits.
- Loop amplifier and active loop filter.
- An audio amplifier and a pre-modulation integrator.
- IC voltage regulator for +5 Vdc. A discrete component regulator for +10 Vdc.
- Logic circuitry: address decoder, input signal gates, and a lock indicator circuit.



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Printed in U.S.A.

Table 1 - General Specifications

ITEM	SPECIFICATION
FREQUENCY RANGE	851-870 MHz
LOCK RANGE	500 kHz
CHANNEL SPACING	12.5 kHz
RF POWER OUT(50 Ohm load)	10 to 13 dBm (10 to 20 mW)
RF HARMONICS	< -30 dBc
NON-HARMONIC SPURS	
1 to 200 MHz	<- 90 dBc
200 MHz to 1 GHz	<-60 dBc
CARRIER ATTACK TIME	< 50 mSec
REFERENCE INPUT	
Input level	0 dBm ±1.5 dB
Input impedance	50 Ohm
Frequency	5 to 17.925 MHz (must be integer divisible by channel spacing)
MODULATION SENSITIVITY	5 kHz peak dev/1 Vrms, Adjustable
AF INPUT IMPEDANCE	600 Ohm
AF RESPONSE	
10 Hz	±1.5 dB
1000 Hz	0 dB reference
3 kHz	±1.5 dB
10 Hz SQUARE WAVE MODULATION Sq Wave Droop	<10%
HUM & NOISE	-53 dB
POWER REQUIREMENTS	13.8 Vdc @325 mA

CIRCUIT ANALYSIS

VOLTAGE CONTROLLED OSCILLATOR

Amplifier U1 and associated circuitry comprise a low noise voltage controlled oscillator. The oscillation frequency is determined by a temperature compensated dielectric resonator/metallic cavity combination. The oscillator is designed to operate at twice the station transmitter frequency in order to maintain a relatively small cavity size. The resonator is inductively coupled to the amplifier U1. Also, the oscillator output signal is provided by inductive coupling within the cavity.

Two methods of changing the oscillator frequency are provided:

- 1) Mechanical tuning
- 2) Electrical tuning

Mechanical frequency adjustment is provided by a tuning screw which penetrates the oscillator cavity. Frequency change is caused by the interaction of the screw and the internal cavity fields. Mechanical adjustments over the full 19 MHz range is available.

Electrical frequency adjustment is provided by two voltage variable capacitance diodes (varicaps), D1 and D2. These diodes are inductively coupled to the resonator. Both the synthesizer control voltage and AF voltage for modulation are applied to the diodes. Electrical tuning is restricted to a 500 kHz range.

BUFFER AMPS AND DIVIDE BY 2 PRESCALER

The output of the Voltage Controller Oscillator is fed to MMIC Amplifier U901, which buffers the signal and drives ECL Prescaler U902. This divide by 2 device converts the signal from 1702-1740 MHz, down to 851-870 MHz. The output of U902 is buffered by MMIC Amplifier U903 and fed to a chain of RF amplifiers.

RF AMPLIFIERS

The RF Amplifiers begins with resistive splitter R201-R204, R216-R218. The output of the splitter at R203 is attenuated by 10 dB and provides match to drive MMIC amplifier U201 into compression. U201 drives output amplifier U202 into compression, with a gain of about 9 dB. The output amplifier is followed by a bandpass filter (FL201), a lowpass filter (C216, C217, L203) and resistive attenuator (R213-R215). These circuits suppress harmonic content, and provide a good 50 ohm port at J2. The final output at the front panel BNC Connector (J2) is nominally 11.5 dBm, and drives the station power amplifier.

The other output of the resistive splitter at R218 is attenuated by 10 dB and drives MMIC compression amplifier U203. This amplifier drives the synthesizer prescaler, providing a feedback signal for the synthesizer phase locked loop.

REFERENCE BUFFER AMPLIFIER

Transistor Q401 and associated components comprise an amplifier for the 12.8 MHz reference signal. The reference oscillator is located in the receiver synthesizer module of a MASTR III station. The 0 dBm reference signal is fed through the front panel BNC Connector J1. R405 provides a 50 ohm load to the reference oscillator. The output of the reference signal amplifier is fed directly to the synthesizer integrated circuit. The output level is approximately 3 V peak-to-peak AC.

PRESCALER & SYNTHESIZER

Integrated circuit U402 is the heart of the synthesizer. It contains the necessary frequency dividers and control circuitry to synthesize output frequencies by the technique of dual modulus prescaling. U402 also contains an analog sample and hold phase detector and a lock detector circuit.

On board U402 are three programmable dividers which are loaded serially using the clock, data, and enable inputs (pins 11, 12, and 13 respectively). A serial data stream on data input pin 12 is shifted into internal shift registers by low

The phase detector output is a voltage which is proportional to the phase difference between Fv and Fr. This phase detector output serves as the loop error signal. This error voltage forces the voltage controlled oscillator to whatever frequency is required to keep Fv and Fr locked (identical).

LBI-39026

to high transitions on the clock input pin 11. A logic high on enable pin 13 then transfers the program information from the shift registers to the divider latches.

The 12.8 MHz reference signal applied to pin 2 of U402 is divided by the 14-bit "R" divider within the integrated circuit. In the case of the 800 MHz transmitter synthesizer, R=1024 in order to divide the 12.8 MHz signal down to 12.5 kHz (Fr.). This provides synthesizer steps of 12.5 kHz required to cover both 12.5 kHz and 25 kHz channel spacings.

The 7-bit "A" divider and 10-bit "N" divider serve to process the loop feedback signal provided by the Voltage controlled oscillator (by way of the dual modulus prescaler U401). Therefore the output of the "N" divider (Fv) is a divided version of the voltage controlled oscillator output.

Synthesizer integrated circuit U402 also contains logic circuitry to control the dual modulus prescaler U401. This prescaler is characterized by P/(P+1) = 128/129. Under locked conditions the voltage controlled oscillator output frequency Fout = Ntotal * Fr. where Ntotal = N*P+A. N and A must be programmed properly for any given synthesizer output frequency.

Example:		
For Desired Fout	=	860 MHz
with Fr	=	12.5 kHz
and P	=	128
Ntotal = Fout/Fr	=	68800

Assuming A=0, the N = Ntotal/P = 537.5but N must be integer, therefore N = 537

The fractional part of Ntotal/P is accounted for by A

A = Ntotal - N*P = 64

In this example, the locked synthesizer output frequency is 860 MHz. The prescaler output nominally will be equal to 860 MHz/P = 6.71875 MHz. This frequency is further divided down to Fv by the "N" divider in U402. Fv is then compared with Fr in the phase detector.



LOOP BUFFER AMPLIFIER AND ACTIVE LOOP FILTER

The error signal provided by the phase detector output is buffered by inverting Op-Amp U501.1. The audio modulation signal is summed with the loop error signal through the non-inverting input of U501.1.

The output of the buffer drives active loop filter U501.2 and associated components (R506, R507, C505, and C506). This active filter provides a low impedance drive to the VCO control line input. Audio modulation is summed with filtered loop error signal by resistive tap R518 and R612.

The bandwidth of the phaselock loop is determined in part by the bandwidth of the loop filter. The 800 MHz transmitter synthesizer has a loop bandwidth of about two hertz. This is very narrow, resulting in an excessively long loop acquisition time. To speed acquisition, switches U502.1 and U502.2 widen loop filter bandwidth during the time period of the enable pulse.

AUDIO FREQUENCY AMPLIFIER

The transmitter synthesizer audio input line is fed to U601.2. U601.2 is configured as low gain op-amp. Resistor R601 sets the input impedance of this amplifier.

The amplifier output is split into two components and fed to two variable resistors VR601 and VR602. VR601 sets the level in the low frequency audio path and VR602 sets the level in the high frequency audio path.

The wiper of VR601 (low frequency path) connects to the input of U601.1, the pre-modulation integrator. U601.1 performs the function of a lowpass filter and integrator. The integrator output is summed with the phaselock loop control voltage at the input of loop buffer amplifier U501.1. This integrated audio signal phase modulates the voltage controlled oscillator. The combination of pre-integration and phase modulation is equivalent to frequency modulation.

VOLTAGE REGULATORS

U301 is a monolithic voltage regulators (+5 V). This voltage is used by synthesizer circuitry. Also the +5 V regulator output is used as a voltage reference of the discrete circuit +10 V regulator.

U302A, O302 and associated circuitry comprise a +10 Volt regulator. Most module circuitry is powered from the +10 V line. This regulator is optimized for especially low noise performance. This is critical because the low noise voltage controlled oscillator is powered by the +10 V line.

LOGIC CIRCUITRY

Logic circuitry (other than that inside the synthesizer integrated circuit) consists of 1) an address decoder, 2) input gates and level shifters, and 3) lock indicator circuitry.

U702 performs the function of an address decoder. When the inputs on A0, A1, and A2 are at set to the proper logic states (110 for the transmitter synthesizer) gates U701A, U701B, and U701D are turned on and allow the clock, data, and enable information to pass. Transistors Q701, Q702, and Q703 are level shifters from 5 V logic to 8 V logic as required by the synthesizer integrated circuit U402.

U705A and U705B comprise a latch for the lock detector signal. This latch is reset by the enable pulse during initial loading of data into the synthesizer. If at any time afterwards the lock detector signal goes low, this latch will be set. In turn the front panel LED will be turned on by U705C and Q704. Also an out-of-lock condition will be registered by a logic low at the output of U705D.

sizer Module:

Figure 1 - Block Diagram

MAINTENANCE

RECOMMENDED TEST EQUIPMENT

The following test equipment is required to test the synthe-

1. RF signal source for 12.8 MHz, 0 dBm reference (included with item 10)

2. AF Generator or Function Generator

3. Modulation Analyzer; HP 8901A, or equivalent, or a 800 MHz receiver

4. Oscilloscope; 20 MHz

5. DC Meter; 10 meg ohm (for troubleshooting)

6. Power Supply; 13.8 Vdc @ 400 mA

7. Spectrum Analyzer; 0-2 GHz

8. Frequency Counter; 10 MHz - 1 GHz

9. Personal Computer (IBM PC compatible) to load frequency data

10. Service Parts Kit, (TQ-0650), (includes software for loading frequency data)

TEST PROCEDURE

(Steps 5, 6, and 7 can be done using a modulation analyzer or 800 MHz receiver with 750µs de-emphasis switchable in or out.

1. Lock synthesizer at 860.5 MHz using software provided in the service parts kit.

Verify lock (flag = high). Verify front panel LED is off.

2. Measure output frequency.

Verify frequency = $860.5000 \text{ MHz} \pm 500 \text{ Hz}$.

3. Measure harmonic content (1721 MHz).

Verify 2nd harmonic is < -30 dBc.

4. Measure RF power output into 50 ohm load.

Verify 10 to 13 dBm (10 to 20 mW).

5. Measure AF distortion with standard modulating signal input.

Verify <5%.

6. Measure Hum and Noise relative to 0.44 kHz average deviation, (de-emphasis on).

Verify < -55dB

7. Measure AF response at 300 Hz, 1 kHz (ref) and 3 kHz, (de-emphasis off).

Verify within ±1.5 dB with respect to 1 kHz reference.

- 8. Verify lock at different frequencies.
 - a. Lock synthesizer at 860.0 MHz. Verify LED is off.
 - b. Lock synthesizer at 860.25 MHz. Verify LED is off.
 - c. Lock synthesizer at 860.75 MHz. Verify LED is off.
 - d. Lock synthesizer at 861.0 MHz. Verify LED is off.

SERVICE NOTES

The following service information applies when aligning, testing, or troubleshooting the TX Synthesizer:

- Standard Modulating Signal = 1 kHz sinussoidal voltage, 0.6 Vrms at the module input terminals (600 ohm R_{in}).
- Logic Levels: Logic 1 = high = 4.5 to 5.5 Vdc Logic 0 = Low = 0 to 0.5 Vdc
- Transmitter Synthesizer Address = A0 A1 A2 = 110
- Synthesizer data input stream is as follows:
 - 14-bit "R" divider most significant bit (MSB) = R13 through "R" divider least significant bit (LSB) = R0

10-bit "N" divider MSB = N9 through "N0" divider, LSB = N0

7-bit "A" divider MSB = A6 through "A0" divider, LSB = A0

Single high Control bit (last bit)

Latched When Control Bit = 1DATA ENTRY FORMAT



For the transmitter synthesizer, 12.5 kHz channel spacing R = 1024N = integer part of (frequency in kHz)/(320) A = (frequency in kHz)/(5) - 12.8*NAll numbers must be converted to binary.

- ANT_REL line must be logic low (0V) in order to lock synthesizer.
- Synthesizer lock is indicated by the extinguishing of the front panel LED indicator and a logic high on the fault flag line (J3 pin 13C).
- Always verify synthesizer lock after each new data loading.

ALIGNMENT PROCEDURE

- 1. Apply +13.8 Vdc. Verify the current drain on the 13.8 volt supply is 860.5 MHz <400 mA.
- 2. Lock the synthesizer at 860.5 MHz <400 mA. Adjust trimmer slug until Vtest (23A) reads 5.0 ± 0.05 V.
- 3. Lock synthesizer at 860.5 MHz for the following three adjustments.
- Set VR602 for 4.5 kHz peak deviation with a standard modulating signal applied to the audio input.

TROUBLESHOOTING GUIDE

SYMPTOM	CHECK (CORRECT READINGS SHOWN)	INCORRECT READING INDICATES DEFECTIVE COMPONENT
SYNTHESIZER FAILS TO LOCK	Check DC voltages +5 V @ U301 Pin 1 +10V @ Q301 collector	U301 or associated components U301, Q301, Q302 or associated components
	Check 12.8 MHz reference signal 3V P-P, 12.8 MHz @ U402 Pin 2	No reference signal to front panel BNC or Q401
	Check oscillator signal	
	11.5 ±1.5 dBm 850 to 870 MHz at front panel BNC	Proceed to "Low/No RF output" below
	Check prescaler output	
	1V P-P, 6.7 MHz @ U401 Pin 4	U203, U401
	Check CLOCK, DATA, ENABLE	
	While loading frequency data into synthesizer Check 8V logic signals @ Pins 11, 12, 13 of U402	Wrong address or U701, U702, Q701, Q702, Q703
	Check Phase detector output	U402, U501
	12.5 kHz random signal @ U402 Pin 15	
Low/No RF Output	Check oscillator	
	Check RF chain	
No Modulation	Check AF amplifier	U601
	Apply 1V, 1 kHz signal to TX/Audio/Hi	
	Check 1V signal @ U601 Pin 7	

- Set VR601 for 4.5 kHz peak deviation with 0.6 Vrms, 10 Hz sine wave audio applied to module AF input.
- Apply a 10 Hz 0.85 Vpk square wave (same peak value as 0.6 rms (sine wave) to module AF input. Adjust VR601 slightly for the flattest demodulated square wave using a modulation analyzer or receiver (no de-emphasis) and an oscilloscope. The maximum net variation in voltage over 1/2 cycle is $\pm 10\%$.

TROUBLEHSOOTING

A troubleshooting guide is provided showing typical measurements at the various test points.

UHF TRANSMITTER SYNTHESIZER MODULE 19D902780G5

ISSUE 1

SYMBOL	PART NUMBER	DESCRIPTION	C305
		MISCELLANEOUS	C306
2	19D902508P4	Chassis.	0000
3	19D902509P2	Cover.	C307
4	19D902555P1	Handle.	
6	19A702381P506	Screw, thread forming: TORX, No. M3.56 x	C314
		6.	C315
7	19A702381P513	Screw, thread forming: TORX, No. M3.5 -	C316
	40000504004	U.6 X 13.	C401
0	19023031001	Nameplate.	C402
10	19A702301F500	Sciew, that form. No. 3.3-0.6 x 6.	
22	19D902024F1	Casting.	C403
22	190902309F0	Scrow the form: No. 3.5.0.6 x 8	C405
23	1000/97701	Sciew, tild. 10111. No. 3.3-0.6 x 8.	C406
24	19D90407711	Screw: Tuning	
25	190032430F1	Stop put	C407
20	RTMUA50101/2	Screw tuning	C408
28	RTMUA50101/2	Snacer	
20	SBA401040/0250	Screw: Nylon	C409
30	19A702381P1406	Screw: M2.5 x 6. Thread Forming, Pan	0.00
00	13/1/023011 1400	Head, Torx Drive, Zinc Plated.	C410
			C411
		TRANSMITTER SYNTHESIZER BOARD	C412
			C413
C1	10A705205P2	Tantalum: 1 uE 16 VDCW: sim to Sprague	C414
	13410320312	293D.	
C2		Ceramic: 0.01 µF ±10%, 50 VDCW.	C415
C3	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef	C502
thru		0 ±30 PPM.	0001
C7	194702052P14	Ceramic: 0.01 uE +10% 50 VDCW	C503
C8	19A705205P2	Tantalum: 1 uF 16 VDCW: sim to Sprague	C504
00		293D.	
C9	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef	C505
and C10		0 ±30 PPM.	C506
C201	194702236P38	Ceramic: 33 pE +5% 50 VDCW temp coef	C507
and	13/11/022001/00	0 ±30 PPM/°C.	C508
C202			C602
C203	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.	0602
C204 thru	19A702236P38	Ceramic: 33 pF \pm 5%, 50 VDCW, temp coet	0000
C206			C604
C207	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.	
C211	19A702236P38	Ceramic: 33 pF ±5%, 50 VDCW, temp coef	C605
C212		0 ±30 PPM/°C.	C606
C213	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.	
C214	19A702236P38	Ceramic: 33 pF ±5%, 50 VDCW, temp coef	C701
and		0 ±30 PPM/°C.	C712
C215	10A702226P12	Coromic: 3.0 pE +0.25 pE 50 \/DC\//: tomp	C714
and	19A702230F12	coef $0 + 30$ PPM.	and C715
C217			C716
C301	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp	and
0000	404700050044		C/17
C302	19A702052P14	Ceramic: 0.01 μF ±10%, 50 VDGW.	C901 thru
*COMPONEN	ITS, ADDED, DELETE	D OR CHANGED BY PRODUCTION CHANGES	C903
			C904

SYMBOL	PART NUMBER	DESCRIPTION
C303	19A705205P13	Tantalum: 4.7 μF, 10 VDCW; sim to
and C304		Sprague 293D.
C305	19A705205P7	Tantalum: 10 μF, 25 VDCW; sim to Sprague 293D.
C306	19A705205P2	Tantalum: 1 μ F, 16 VDCW; sim to Sprague 293D.
C307	19A705205P6	Tantalum: 10 μF, 16 VDCW; sim to Sprague 293D.
C314 and C315	19A705205P6	Tantalum: 10 μF, 16 VDCW; sim to Sprague 293D.
C316	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C401	19A702052P14	Ceramic: 0.01 µF ±10%. 50 VDCW.
C402	19A702061P99	Ceramic: 1000 pF \pm 5%, 50 VDCW, temp coef 0 \pm 30 PPM/°C.
C403 thru	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C405		
C406	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C407	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C408	19A702061P99	Ceramic: 1000 pF \pm 5%, 50 VDCW, temp coef 0 \pm 30 PPM/°C.
C409	19A705205P6	Tantalum: 10 µF, 16 VDCW; sim to Sprague 293D.
C410	19A702052P33	Ceramic: 0.1 µF ±10%, 50 VDCW.
C411	19A705205P6	Tantalum: 10 μF, 16 VDCW; sim to Spraque 293D.
C412	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C413	19A702052P108	Ceramic: $0.01 \mu\text{E} \pm 10\%$ 50 VDCW
C414	19A702061P69	Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C415	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C502	19A705205P2	Tantalum: $1 \mu\text{F}$, 16 VDCW; sim to Sprague 293D.
C503	19A702052P33	Ceramic: 0.1 µF ±10%, 50 VDCW.
C504	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C505	19A703684P3	Polyester: 2.2 µF, 50 VDCW.
C506	19A702250P113	Polvester: 0.1 µF +10%, 50 VDCW.
C507	19A702052P33	Ceramic: 0.1 µF ±10%, 50 VDCW.
C508	19A702250P113	Polvester: $0.1 \mu\text{F} \pm 10\%$ 50 VDCW
C602	19A705205P6	Tantalum: 10 μF, 16 VDCW; sim to
C603	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C604	19A705205P2	Tantalum: 1 μF, 16 VDCW; sim to Sprague 293D.
C605	19A703684P3	Polvester: 2.2 µF. 50 VDCW.
C606	19A705205P6	Tantalum: 10 μF, 16 VDCW; sim to Sprague 293D.
C701	19A702061P61	Ceramic: 100 pF +5% 50 VDCW temp
thru C712	10/11 02 0011 01	coef 0 ± 30 PPM.
C714 and C715	19A702061P99	Ceramic: 1000 pF \pm 5%, 50 VDCW, temp coef 0 \pm 30 PPM/°C.
C716 and	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C717 C901 thru	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp
C903	104702052014	Coramic: $0.01 _{\text{HE}} \pm 10\%$ 50 VDCW
0004	10/11/02/03/21 14	coramic. 0.01 μ1 ±10/0, 00 νDOVν.

CA95 14/302289728 Caramic: 32 pf =5%, 50 VCCW, temp coel 0 =30 PFM/C. P219 198000077710 Metal film: 120 chms =5%, 18 w. CA96 194702289738 Caramic: 33 pf =5%, 50 VCCW, temp coel 0 =30 PFM/C. 198700207711 Metal film: 120 chms =5%, 18 w. CA97 1947002389738 Caramic: 33 pf =5%, 50 VCCW, temp coel 0 =30 PFM/C. 19880000779710 Metal film: 120 chms =5%, 18 w. CA97 1947002389738 Caramic: 33 pf =2%, 50 VCCW, temp coel 0 =30 PFM/C. 19880000779100 Metal film: 10 chms =5%, 18 w. C411 1947002389738 Caramic: 33 pf =2%, 50 VCCW, temp coel 0 =30 PFM/C. 1988000077410 Metal film: 10 chms =5%, 18 w. C411 1947002389730 Caramic: 33 pf =2%, 50 VCCW, temp coel 0 =30 PFM/C. 1988000077410 Metal film: 10 chms =5%, 18 w. C411 1947002389730 Dode: virtuble apachtree. 1988000077410 Metal film: 10 chms =5%, 18 w. C411 1947002381723 Metal film: 10 chms =5%, 18 w. R030 198800007741 Metal film: 10 chms =5%, 18 w. C412 1947002381723 Metal film: 10 chms =5%, 18 w. R030 198800007741 Metal film: 10 chms =5%, 18 w. C413 1947002381723	SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION
Come Partners Star Park Star	C905	19A702236P28	Ceramic: 12 pF +5%, 50 VDCW, temp coef 0	R218	19B800607P100	Metal film: 10 ohms +5% 1/8 w
Code 194702289733 Camme: 3 pt + 5%, 50 VDCV, temp cod 0 -30 PPM/C. Razz 194702289741 Camme: 30 pt + 5%, 50 VDCV, temp cod 0 -30 PPM/C. Code 19470228973 Camme: 30 pt + 5%, 50 VDCV, temp cod 0 -30 PPM/C. Razz 198702007791 Mean Birn: 10 ohms ±5%, 10 w. Code 19470228973 Camme: 30 pt + 5%, 50 VDCV, temp cod 0 -30 PPM/C. Razz 1988006077910 Mean Birn: 20 ohms ±5%, 10 w. Cole 19470228973 Camme: 33 pt + 5%, 50 VDCV, temp cod 0 -30 PPM/C. Razz 1988006077910 Mean Birn: 10 ohms ±5%, 10 w. Cole 19470228973 Camme: 33 pt + 5%, 50 VDCV, temp cod 0 -30 PPM/C. Razz 1988006077910 Mean Birn: 200 ohms ±5%, 10 w. Cole 19470228973 Camme: 33 pt + 5%, 50 VDCV, temp cod 0 -30 PPM/C. Razz 1988006077910 Mean Birn: 200 ohms ±5%, 10 w. Cole 19470238973 Dobe: Variable capacience. Mean Birn: 200 ohms ±5%, 10 w. Razz 198800607791 104 Dobe: Variable capacience. Mean Birn: 200 ohms ±5%, 10 w. Razz 198800607791 Mean Birn: 200 ohms ±5%, 10 w. 11 21 21 21 21 21 21 21 21 21 21 21 21 2			±30 PPM.	R219	19B800607P121	Metal film: 120 ohms ±5% 1/8 w
Corr 143702052P14 Corrent: 30 PEM/C. 1438000077P14 Meat lim: 10 ohms 25%, 10 w. Corr 143702238P3 Corrant: 30 PEM/S, 50 VDCW. 128900077P14 Meat lim: 10 ohms 25%, 10 w. Corr 134702032P14 Corrant: 30 PEM/S, 50 VDCW. 128900077P14 Meat lim: 10 ohms 25%, 10 w. Corr 134702032P14 Corrant: 50 PEM/S, 50 VDCW. 128900077P14 Meat lim: 10 ohms 25%, 10 w. Corr 134702037P2 Corrant: 50 PEM/S, 50 VDCW. R304 138000077P141 Meat lim: 10 ohms 25%, 10 w. Corr 134702037P2 Corrant: 50 PEM/S, 50 VDCW. R304 138000077P141 Meat lim: 10 ohms 25%, 10 w. Corr 134702037P2 Diote Sime PER/S R304 138000077P10 Meat lim: 10 ohms 25%, 10 w. FL201 134702037P2 Billion, fast incovery (2 dicks in serier). R314 188000077P11 Meat lim: 10 ohms 25%, 10 w. FL1 134702037P2 Billion, fast incovery (2 dicks in serier). R411 188000077P11 Meat lim: 10 ohms 25%, 10 w. FL2 134702037P2 Corrist Connector. DN: 6 meals contach, right angle R4141 188000077P14 Meat	C906	19A702236P38	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0	R223	19B800607P510	Metal film: 51 ohms +5%, 1/8 w.
C407 1947/02/38/214 Ceramic: 0.01 µf = 10%; 50 VICOW. Hard Section = 25%; 18 w. C411 1947/02/38/28 Ceramic: 0.01 µf = 10%; 50 VICOW. Hard Section = 25%; 18 w. C411 1947/02/38/29 Ceramic: 0.01 µf = 10%; 50 VICOW. Hard Section = 25%; 18 w. C411 1947/02/38/29 Ceramic: 0.01 µf = 10%; 50 VICOW. Hard Section = 25%; 18 w. C411 1947/02/38/29 Ceramic: 33 pf = 55%; 50 VICOW. Hard Section = 25%; 18 w. C47001 1947/02/38/29 Didde: Variable capacitience. Hard Section = 25%; 18 w. D1 R472/23/87/20 Didde: Variable capacitience. Hard Section = 25%; 18 w. D2 1947/03/88/17 Didde: Variable capacitience. Hard Section = 25%; 18 w. D4 1947/03/88/17 Didde: Variable capacitience. Hard Section = 25%; 18 w. D4 1947/03/88/17 Didde: Variable capacitience. Hard Section = 25%; 18 w. D4 1947/03/88/17 Didde: Variable capacitience. Hard Section = 25%; 18 w. D4 1947/03/88/17 Didde: Variable capacitience. Hard Section = 25%; 18 w. D4 1947/03/88/17 Contaid Cannector.<			±30 PPM/°C.	R224	19B800607P181	Metal film: 180 ohms ±5% 1/8 w
Composition 1947/02288/P86 Ceramic: 30 pF ±3%, 50 VDCW, temp cool 0 1947/02288/P86 Ceramic: 001 µF ±10%, 50 VDCW, temp cool 0 1947/02288/P86 Ceramic: 30 pF ±3%, 50 VDCW, temp cool 0 1988008077120 Metal filte: 147 drbms ±5%, 18 w. C011 1947/02288/P86 Ceramic: 30 pF ±3%, 50 VDCW, temp cool 0 1988008077120 Metal filte: 147 drbms ±5%, 18 w. C011 1947/02288/P86 Ceramic: 30 pF ±3%, 50 VDCW, temp cool 0 1988008077120 Metal filte: 147 drbms ±5%, 18 w. C011 1947/02381P261 Dode: Vanable capacitonce. 1947/02381P261 Metal filte: 147 drbms ±5%, 18 w. FL201 1947/02581P26 Dode: Vanable capacitonce. 11 1988008077121 Metal filte: 147 drbms ±5%, 18 w. FL201 1947/04588P1 Dode: Vanable capacitonce. F1276 1988008077121 Metal filte: 147 drbms ±5%, 18 w. FL201 1947/04588P1 Bardgoase Filter, 561 / 87 HHz: sim to: Martata F128 1988008077121 Metal filte: 147 drbms ±5%, 18 w. FL201 1947/04588P1 Connector. Conside Contactor, 11 Hz: sim to: Martata F148 1988000077120 Metal filte: 147 drbms ±5%, 18 w. 141 1947/04588P1	C907	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.	R225	19B800607P271	Metal film: 270 ohms +5%, 1/8 w.
1000 C011 14770223FP3 Comments 25%, 16 w. 1011 19470223FP3 Comments 33 p E45%, 50 VDCW, Comments 33 p E45%, 50 VDCW, temp cool 0 R335 198800677101 Metal film: 47 drams ±5%, 16 w. 1011 19470223FP38 Comments 33 p E45%, 50 VDCW, temp cool 0 R335 198800677102 Metal film: 126 drams ±5%, 16 w. 1011 872320603 Dode: Variable capacitance. R337 198800677102 Metal film: 20 drams ±5%, 16 w. 11 872320603 Dode: Variable capacitance. R341 198800677102 Metal film: 20 drams ±5%, 16 w. 120 194703561P2 Silicon, fast recovery (2 dodes in series). R441 198800077102 Metal film: 20 drams ±5%, 16 w. 131 1988006771710 Metal film: 20 drams ±5%, 16 w. R440 198800077102 Metal film: 10 drams ±5%, 16 w. 131 1984105381P2 Coxial Connector. NACKS	C908	19A702236P38	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0	R301	19B800607P100	Metal film: 10 obms +5% 1/8 w
CH1 1947/0238/P4 Ceramic: 0.01 µ = /1.09, S1 VUCW, temp cool 0 198006077P120 Metal film: 147 ohms ±5%, 18 w. CR701 1947/0238/P50 Ceramic: 30 F ±5%, 50 VUCW, temp cool 0 198006077P123 Metal film: 147 ohms ±5%, 18 w. CR701 1947/0238/P50 Openetric: Real LED; pin to HP HLMP-1301-010. R304 198006077P123 Metal film: 100 ohms ±5%, 18 w. Data PL2 Dode: Variable capacition.e. FL201 1947/0358/P10 Dode: Variable capacition.e. FL201 1947/0358/P12 Metal film: 100 ohms ±5%, 18 w. FL201 1947/0358/P20 Dode: Variable capacition.e. FL201 1947/0358/P20 Metal film: 100 ohms ±5%, 18 w. FL201 1947/0458/P1 Station, fast recovery (2 diodes in series). FL201 1947/0458/P1 Metal film: 100 ohms ±5%, 18 w. FL201 1947/0458/P1 Commotor. JACKS FL201 1947/0458/P1 Metal film: 100 ohms ±5%, 18 w. FL201 1947/0458/P1 Commotor. JACKS HA11 198006077P10 Metal film: 100 ohm ±5%, 18 w. FL201 1947/0458/P1 Commotor. JACKS	thru C910		±30 PPM/°C.	thru	102000011100	
C912 IpA702236P38 Coramic: 33 pF 39, 60 VDCW, temp could Passes CR701 IpA70235P30 Counter: 33 pF 39, 60 VDCW, temp could R305 IpB800007P102 Meal film: 10 K omms 15%, 10 W. CR701 IpA70235P20 Optorelectic: Red LED; sim to HP R305 IpB800007P101 Meal film: 10 choms 15%, 10 W. D1 R423 IpB800007P101 Meal film: 10 choms 15%, 10 W. R305 D401 IpA7035561P2 Silicon, fast recovery (2 diodes in series). R401 IpB800007P101 Meal film: 10 choms 15%, 10 W. FL201 IpA704588P1 Silicon, fast recovery (2 diodes in series). R401 IpB800007P101 Meal film: 10 choms 15%, 10 W. FL201 IpA704588P1 Coalel Connector. R403 IpB800007P101 Meal film: 10 choms 15%, 10 W. FL201 IpA704588P1 Coalel Connector. R404 IpB800007P102 Meal film: 10 choms 15%, 10 W. FL201 IpA704588P1 Coale file Coale file R405 IpB80007P104 Meal film: 21% chons 15%, 10 W. FL201 IpA704570P3 Coale file Coale file Coale file Koale file <td>C911</td> <td>19A702052P14</td> <td>Ceramic: 0.01 μF ±10%, 50 VDCW.</td> <td>R303</td> <td></td> <td></td>	C911	19A702052P14	Ceramic: 0.01 μF ±10%, 50 VDCW.	R303		
Lido PNA/C Holdo Cite Holdo C	C912	19A702236P38	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0	R304	19B800607P470	Metal film: 47 onms $\pm 5\%$, 1/8 w.
CR701 1947033959F10 Metal film: 200 ohms ±1%, 200 VDCW, 18 w. CR701 194703397230 Metal film: 12, 200 ohms ±1%, 200 VDCW, 18 w. D1 dr RX230603 Dode: Variable capacience. R331 19800007P100 Metal film: 10 ohms ±5%, 18 w. P100 194703397230 Dode: Variable capacience. R331 19800007P101 Metal film: 10 ohms ±5%, 18 w. P1001 194703561P2 Silicon, 1ast recovery (2 diodes in series). Metal film: 33 ohms ±5%, 18 w. F1201 194703561P2 Silicon, 1ast recovery (2 diodes in series). Metal film: 10 ohms ±5%, 18 w. F1201 194703561P2 Metal film: 10 ohms ±5%, 18 w. R401 19800007P101 Metal film: 10 ohms ±5%, 18 w. F1201 194703578730 Metal film: 20 ohms ±5%, 18 w. R402 19800007P101 Metal film: 10 ohms ±5%, 18 w. F1201 19470587078 Constal Connector. Adv R403 19800007P101 Metal film: 21 ohms ±5%, 18 w. 134 19470587078 Coll, Fixed: 22 nH ± sim to Toko 380NB-22nM R404 19880007P274 Metal film: 47K ohms ±5%, 18 w. 134 194705470P5 Coll, Fixed: 23 nH			±30 PPM/°C	R305	19B800607P103	Metal film: 10K ohms \pm 5%, 1/8 w.
CR701 147/03395P1 Head Im: 200 ohms 14%, 200 VDCW, 18 w. P100ES P100ES P100ES P100ES P100ES P100ES P10ES <td></td> <td></td> <td></td> <td>R306</td> <td>19B800607P152</td> <td>Metal film: 1.5K ohms ±5%, 1/8 w.</td>				R306	19B800607P152	Metal film: 1.5K ohms ±5%, 1/8 w.
CR701 1\$4703569F10 Optoelectic: Red LED: sim to HP HLMP-1301-010. H308 1\$970429311230 Metal film: 200 oftms ±1%, 18 w. D1 and D2 BA703561P2 Silicon, fast recovery (2 dodes in series). R411 1\$98000677110 Metal film: 10 oftms ±5%, 18 w. FL201 19A703861P2 Silicon, fast recovery (2 dodes in series). R401 1\$98000677110 Metal film: 10 oftms ±5%, 18 w. FL201 19A703861P2 Silicon, fast recovery (2 dodes in series). R401 198000077501 Metal film: 10 oftms ±5%, 18 w. FL201 19A703861P2 Silicon, fast secovery (2 dodes in series). R401 198000077501 Metal film: 10 oftms ±5%, 18 w. FL201 19A703870P2 Consict Connector. R404 198000077401 Metal film: 10 oftms ±5%, 18 w. F406 198000077470 Metal film: 200 oftms ±5%, 18 w. R406 198000077470 Metal film: 10 oftms ±5%, 18 w. L1 19A70547075 Conli Fixed: 20 nH; sim to Toko 380NB-39nM. R414 1988000077473 Metal film: 300 oftms ±5%, 18 w. R411 19A70547075 Coll, Fixed: 20 nH; sim to Toko 380NB-39nM. R414 1988000077473 Metal film: 300 oft			DIODES	R307	19A702931P230	Metal film: 2000 ohms ±1%, 200 VDCW, 1/8 w.
HLMP-1301-010. HLMP-13	CR701	19A703595P10	Optoelectric: Red LED; sim to HP	R308	19A702931P230	Metal film: 2000 ohms \pm 1%, 200 VDCW, 1/8 w.
1 brid brid brid brid brid brid brid brid			HLMP-1301-010.	R313 and	19B800607P100	Metal film: 10 ohms \pm 5%, 1/8 w.
Bar Bar <td>D1</td> <td>RKZ320603</td> <td>Diode: Variable capacitence.</td> <td>R314</td> <td></td> <td></td>	D1	RKZ320603	Diode: Variable capacitence.	R314		
D401 19A703661P2 Silicon, fast recovery (2 diodes in series). FL FL201 19A704888P1 Silicon, fast recovery (2 diodes in series). FL FL201 19A704888P1 Bindgaas Filer, 851-871 MHz; sim to: Murata Directory. JACKS FR403 198800607P104 Metal film:: 100K chms ±5%, 1/8 w. FL201 19A704888P1 Coaxial Connector. FR403 198800607P104 Metal film:: 100K chms ±5%, 1/8 w. J1 32d 198801587P7 Coaxial Connector. FR404 198800607P104 Metal film:: 100K chms ±5%, 1/8 w. FR405 198800607P104 Metal film:: 100K chms ±5%, 1/8 w. FR405 198800607P104 Metal film:: 100K chms ±5%, 1/8 w. J1 32d 198001587P7 Coaxial Connector. FR405 198800607P120 Metal film:: 47K chms ±5%, 1/8 w. R410 198800607P120 Metal film:: 47K chms ±5%, 1/8 w. FR416 198800607P120 Metal film:: 47K chms ±5%, 1/8 w. L202 19A705470P8 Coli, Fixed: 39 nH; sim to Toko 380NB-33M. FR416 198800607P123 Metal film:: 60 chms ±5%, 1/8 w. L203 19A705470P8 Coli, Fixed: 39 nH; sim to Toko 380NB-33M. FR416	and D2			R315	19B800607P1	Metal film: 0 ohms ±5%, 1/8 w.
FL201 19A704888P1 ExtERS FLTERS FLTERS J1 19A704888P1 Bandpass Filter, 651 e71 MHz; sim to: Murata DFC3R86 (P020BTD. R403 1988006077P104 Metal film: 500 chms ±5%, 1/8 w. J1 19A115938P24 Coaxial Connector. JACKS R407 1988006077P104 Metal film: 500 chms ±5%, 1/8 w. J2 Coaxial Connector. JACKS Coaxial Connector. R407 1988006077P104 Metal film: 500 chms ±5%, 1/8 w. J3 198801587P7 Connector, DN: 96 male contacts, right angle mounting: sim to AMP 650887-1. R407 1988006077P104 Metal film: 22K chms ±5%, 1/8 w. R401 1988006077P104 Metal film: 47K chms ±5%, 1/8 w. R410 1988006077P104 Metal film: 22K chms ±5%, 1/8 w. L1 198705470F8 Col, Fixed: 39 nH; sim to Toko 380NB-33MM. R411 1988006077P103 Metal film: 47K chms ±5%, 1/8 w. L202 19A705470F8 Col, Fixed: 22 nH; sim to Toko 380NB-33MM. R414 1988006077P103 Metal film: 30 chms ±5%, 1/8 w. L203 19A705470P8 Col, Fixed: 39 nH; sim to Toko 380NB-33MM. R411 1988006077P103 Metal film: 10 chms ±5%, 1/8 w.	D401	19A703561P2	Silicon, fast recovery (2 diodes in series).	R401	19B800607P330	Metal film: 33 ohms ±5%, 1/8 w.
FL201 19A704888P1			····,	R402	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
FL201 19A704888P1 Bandpass Filer, 851471 MHz; sim to: Murata DFC3R861P020BTD. R4401 19B800607P510 Metal film: 50 ohm ±5%, 1/8 w. J1 ard J2 J3 19A115938P24 Coasial Connector. ACKS			FILTERS	R403	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
J.1 JA1 DFC3R861P020BTD. FAd5 198800607P151 Metal film: 51 ohms 15%, 18 w. J.1 19A115938P24 Coaxial Connector. FAd5 198800607P151 Metal film: 51 ohms 15%, 18 w. J.3 19A705470P8 Connector, DIN: 96 male contacts, right angle mounting: sim to AMP 650867.1. FAd5 198800607P122 Metal film: 22 AC wins 15%, 18 w. L1 19A705470P8 Conl, Fixed: 39 nH; sim to Toko 380NB-39nM. FAd5 198800607P123 Metal film: 47K ohms 15%, 18 w. L22 19A705470P8 Coil, Fixed: 32 nH; sim to Toko 380NB-39nM. FAd5 198800607P131 Metal film: 47K ohms 15%, 18 w. L203 19A705470P8 Coil, Fixed: 32 nH; sim to Toko 380NB-39nM. FAd5 19880067P131 Metal film: 50 ohms 15%, 18 w. L203 19A705470P8 Coil, Fixed: 32 nH; sim to Toko 380NB-39nM. FAd5 19880067P131 Metal film: 10 Kohms 15%, 18 w. L201 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. FAd5 19880067P134 Metal film: 10 Kohms 15%, 18 w. L201 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. FAd5 19880067P144 Metal film: 10 Kohms 15%, 18 w.	FL201	19A704888P1	Bandpass Filter. 851-871 MHz: sim to: Murata	R404	19B800607P561	Metal film: 560 ohms ±5%, 1/8 w.
J1 and and J3 19810538724 Coaxial Connector. ACKS R406 1988006077101 Metal film: 10 ohms ±5%, 1/8 w. J3 19880158777 Connector. DN: 96 male contacts, right angle mounting: sim to AMP 650857-1. R408 1988006077100 Metal film: 22 k ohms ±5%, 1/8 w. L1 and L2 198705470P8 Coll, Fixed: 39 nH; sim to Toko 380NB-39M. R411 1988006077103 Metal film: 47K ohms ±5%, 1/8 w. L202 194705470P5 Coll, Fixed: 22 nH; sim to Toko 380NB-39M. R418 1988006077133 Metal film: 47K ohms ±5%, 1/8 w. L301 194705470P5 Coll, Fixed: 39 nH; sim to Toko 380NB-39M. R418 1988006077133 Metal film: 10 k ohms ±5%, 1/8 w. L301 194705470P8 Coll, Fixed: 39 nH; sim to Toko 380NB-39M. R419 1988006077103 Metal film: 10 k ohms ±5%, 1/8 w. L301 194705470P8 Coll, Fixed: 39 nH; sim to Toko 380NB-39M. R421 1988006077103 Metal film: 10 k ohms ±5%, 1/8 w. L301 19470670P2 Silicon, NPN: sim to MMBT3904, low profile. R421 1988006077103 Metal film: 10 k ohms ±5%, 1/8 w. C301 194700076P2 Silicon, NPN: sim to MMBT3904, low profile.			DFC3R861P020BTD.	R405	19B800607P510	Metal film: 51 ohms ±5%, 1/8 w.
Jind Jard Jard Jard Jard Jard Jard Jard Jar				R406	19B800607P151	Metal film: 150 ohms ±5%, 1/8 w.
J1 J2 J3 19A115938P24 J2 Coaxial Connector. R408 19B800607P202 Metal film: 10 ohms ±5%, 18 w J3 19B801587P7 Connector. DN: 96 male contacts, right angle mounting: sim to AMP 650887-1. R410 19B800607P222 Metal film: 47K ohms ±5%, 18 w L1 and L2 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-23mM. R411 19B800607P473 Metal film: 47K ohms ±5%, 18 w. L202 19A705470P5 Coil, Fixed: 39 nH; sim to Toko 380NB-22mM. R418 19B800607P473 Metal film: 10 ohms ±5%, 18 w. L301 19A705470P5 Coil, Fixed: 39 nH; sim to Toko 380NB-39mM. R418 19B800607P103 Metal film: 10 ohms ±5%, 18 w. L301 19A705470P5 Coil, Fixed: 39 nH; sim to Toko 380NB-39mM. R418 19B800607P103 Metal film: 10 ohms ±5%, 18 w. L301 19A706470P5 Silicon, NPN: sim to Motorola MD320C. R501 19B800607P103 Metal film: 10 ohms ±5%, 18 w. R419 19B800607P103 Metal film: 10 ohms ±5%, 18 w. R502 19B800607P103 Metal film: 10 ohms ±5%, 18 w. R419 19B800607P103 Metal film: 10 ohms ±5%, 18 w. R502 19B800607P101 Metal film:			JACKS	R407	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
and J2 R409 198800607P222 Metal film: 2.2K ohms 15%, 1/8 w. J3 198801587P7 Connector, DIN: 96 male contacts, right angle mounting: sim to AMP 650887-1. 198800607P472 Metal film: 4.7K ohms 15%, 1/8 w. L1 and L2 194705470P8 Coil, Fixed: 29 nH; sim to Toko 380NB-39nM. R415 198800607P473 Metal film: 47K ohms 15%, 1/8 w. L202 194705470P8 Coil, Fixed: 22 nH; sim to Toko 380NB-39nM. R416 198800607P473 Metal film: 30 ohms 15%, 1/8 w. L203 344A450P100 Inductor, surface mount: 10 nH ±5%. R418 198800607P103 Metal film: 10K ohms ±5%, 1/8 w. L301 194705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R418 198800607P103 Metal film: 10K ohms ±5%, 1/8 w. L501 194705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R421 198800607P103 Metal film: 10K ohms ±5%, 1/8 w. R302 19470076P2 Silcon, NPN: sim to MMBT3904, low profile. R503 198800607P103 Metal film: 10K ohms ±5%, 1/8 w. R301 19470076P2 Silcon, NPN: sim to MMBT3904, low profile. R504 198800607P104 Metal film: 10K ohms ±5%, 1/8 w. R3	J1	19A115938P24	Coaxial Connector.	R408	19B800607P100	Metal film: 10 ohms ±5%, 1/8 w
Ja 198801587P7 Connector, DIN: 96 male contacts, right angle mounting: sim to AMP 650887-1. 198800607P472 Metal film: 4.7K ohms ±5%, 1/8 w. L1 194705470P8 Coll, Fixed: 39 nH; sim to Toko 380NB-39nM. R411 198800607P473 Metal film: 4.7K ohms ±5%, 1/8 w. L202 194705470P5 Coll, Fixed: 29 nH; sim to Toko 380NB-39nM. R416 198800607P473 Metal film: 30 ohms ±5%, 1/8 w. L203 344A4540P100 Inductor, surface mount: 10 nH ±5%. R418 198800607P433 Metal film: 30 ohms ±5%, 1/8 w. L301 194705470P8 Coll, Fixed: 39 nH; sim to Toko 380NB-39nM. R421 198800607P103 Metal film: 10K ohms ±5%, 1/8 w. L301 194705470P8 Coll, Fixed: 39 nH; sim to Toko 380NB-39nM. R421 198800607P103 Metal film: 10K ohms ±5%, 1/8 w. R400 19470076P2 Silicon, NPN: sim to Motorola MJD32C. R421 198800607P103 Metal film: 10K ohms ±5%, 1/8 w. R501 19470076P2 Silicon, NPN: sim to MMBT3904, low profile. R505 198800607P104 Metal film: 10K ohms ±5%, 1/8 w. R501 198800607P104 Metal film: 10K ohms ±5%, 1/8 w. R511 198800607P104 Met	and			R409	19B800607P222	Metal film: 2.2K ohms ±5%, 1/8 w.
J3 1950/180/7P CollineLio, Jun. 96 mail oblination, injust end marked in the contracts, injust end marked in the contract in the cont	JZ	10000150707	Connector DIN: 06 male contacto right angle	R410	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 w.
L1 INDUCTORS R411 IPA705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R412 IPB800607P473 Metal film: 47K ohms ±5%, 1/8 w. L202 19A705470P5 Coil, Fixed: 22 nH; sim to Toko 380NB-39nM. R411 19B800607P160 Metal film: 16 ohms ±5%, 1/8 w. L203 344A4540P100 Inductor, surface mount: 10 nH ±5%. R411 19B800607P163 Metal film: 10 K ohms ±5%, 1/8 w. L301 19A705470P8 Coil, Fixed: 23 nH; sim to Toko 380NB-39nM. R411 19B800607P164 Metal film: 10K ohms ±5%, 1/8 w. L301 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R411 19B800607P103 Metal film: 10K ohms ±5%, 1/8 w. L301 19A70076P2 Silicon, PNP: sim to Motorala MD32C. R503 19B800607P103 Metal film: 10K ohms ±5%, 1/8 w. C301 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R506 19B800607P104 Metal film: 10K ohms ±5%, 1/8 w. C301 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R506 19B800607P104 Metal film: 10K ohms ±5%, 1/8 w. C301 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R506	13	1960156797	mounting: sim to AMP 650887-1	and		
L1 and L2 19A705470P8 and L2 Coil, Fixed: 39 nH; sim to Toko 380NE-39nM. R412 19B800607P473 Metal lim: 47K ohms ±5%, 18 w. L202 19A705470P5 Coil, Fixed: 22 nH; sim to Toko 380NE-22nM. R416 19B800607P473 Metal lim: 300 ohms ±5%, 18 w. L203 344A450P100 Inductor, surface mount: 10 nH ±5%. R417 19B800607P130 Metal lim: 600 ohms ±5%, 18 w. L301 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NE-39nM. R420 19B800607P103 Metal lim: 10K ohms ±5%, 18 w. L501 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NE-39nM. R420 19B800607P103 Metal lim: 10K ohms ±5%, 18 w. C301 19A149542P2 Silicon, NPN: sim to Toko 380NE-39nM. R420 19B800607P103 Metal lim: 10K ohms ±5%, 18 w. C301 19A149542P2 Silicon, NPN: sim to MMBT3904, low profile. R503 19B800607P104 Metal lim: 100 Kohms ±5%, 18 w. C401 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R506 19B800607P104 Metal lim: 100 Kohms ±5%, 18 w. R7 19B800607P104 Metal lim: 10 Mits 1300 A, low profile. R507 19B800607P104 Metal l				R411	400000000000000	
L1 and 2 IPA705470P8 1PA705470P5 Coil, Fixed: 39 hH; sim to Toko 380NB-39nM. Ref 198200007473 Metal lim: 15 ohm s15%, 18 w. L202 19A705470P5 Coil, Fixed: 22 nH; sim to Toko 380NB-22nM. R416 198800607P681 Metal lim: 330 ohms 15%, 18 w. L203 344A4540P100 Inductor, surface mount: 10 nH ±5%. R417 198800607P681 Metal lim: 10 Kohms 15%, 18 w. L501 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R418 198800607P103 Metal lim: 10 Kohms 15%, 18 w. L501 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R420 198800607P103 Metal lim: 10 Kohms 15%, 18 w. L501 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R421 198800607P103 Metal lim: 10 Kohms 15%, 18 w. C3001 19A149542P2 Silicon, NPN: sim to MMBT3904, low profile. R504 198800607P123 Metal lim: 10 Kohms 15%, 18 w. C301 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 198800607P124 Metal lim: 10 Kohms 15%, 18 w. R2 198800607P104 Metal lim: 10 ohms 15%, 18 w. R511 198800607P101 Metal lim: 10 kohms 15%, 18			INDUCTORS	R412	19B800607P473	Metal film: 47 K onms $\pm 5\%$, $1/8$ W.
and L2 Note of the control of the c	11	19A705470P8	Coil Fixed: 39 nH: sim to Toko 380NB-39nM	R415	19B800607P473	Metal film: 47×0 mms $\pm 5\%$, $1/8 \times 0$
L2 I 9A705470P5 Coil, Fixed: 22 nH; sim to Toko 380NB-22nM. R417 I 9B800607PE31 Metal film: 60 ohms ±5%, 1/8 w. L301 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R418 19B800607PE31 Metal film: 10K ohms ±5%, 1/8 w. L501 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R418 19B800607P103 Metal film: 10K ohms ±5%, 1/8 w. L501 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R420 19B800607P103 Metal film: 10K ohms ±5%, 1/8 w. L501 19A705470PS Silicon, NPN: sim to Mtotroid MJD32C. Silicon, NPN: sim to MMBT3904, low profile. R503 19B800607P104 Metal film: 10K ohms ±5%, 1/8 w. Q401 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R504 19B800607P104 Metal film: 10K ohms ±5%, 1/8 w. Q701 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 19B800607P104 Metal film: 10K ohms ±5%, 1/8 w. R1 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R511 19B800607P101 Metal film: 10K ohms ±5%, 1/8 w. R21 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R511	and			R416	19B800607P150	Metal film: 15 0nms ±5%, 1/8 w.
L202 19A705470P5 Coil, Fixed: 22 ht; sim to foko 380NB-22nM. R414 19B8000607P103 Metal film: 060 mits 25%, 1/8 w. L203 344A4540P100 Inductor, surface mount: 10 nH ±5%. R419 19B800067P103 Metal film: 10K ohms ±5%, 1/8 w. L501 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R419 19B800067P103 Metal film: 10K ohms ±5%, 1/8 w. L501 19A700767P2 Silicon, NPN: sim to MMBT3904, low profile. R503 19B800067P104 Metal film: 10K ohms ±5%, 1/8 w. Q301 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R504 19B80067P104 Metal film: 10K ohms ±5%, 1/8 w. Q401 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 19B800607P104 Metal film: 10K ohms ±5%, 1/8 w. Q701 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 19B800607P104 Metal film: 10K ohms ±5%, 1/8 w. R61 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R511 19B800607P103 Metal film: 10K ohms ±5%, 1/8 w. R201 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R513 19B800607P104 Metal film: 22K ohms ±5%, 1/8 w. R202 19B800607P100 <td< td=""><td>L2</td><td></td><td></td><td>R417</td><td>19B800607P331</td><td>Metal film: 330 onms $\pm 5\%$, 1/8 w.</td></td<>	L2			R417	19B800607P331	Metal film: 330 onms $\pm 5\%$, 1/8 w.
L203 344A4540P100 Inductor, surface mount: 10 nH ±5%, 18 w. L301 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R420 198800607P103 Metal film: 10K ohms ±5%, 18 w. L301 19A149542P2 Silicon, PNP: sim to Motorola MJD32C. R502 198800607P103 Metal film: 10K ohms ±5%, 18 w. Q302 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R502 198800607P104 Metal film: 10K ohms ±5%, 18 w. Q401 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R504 199800607P104 Metal film: 10K ohms ±5%, 18 w. Q701 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 198800607P104 Metal film: 10K ohms ±5%, 18 w. Q701 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 198800607P104 Metal film: 10K ohms ±5%, 18 w. R51 198800607P104 Metal film: 10K ohms ±5%, 18 w. R501 198800607P104 Metal film: 10K ohms ±5%, 18 w. R6 198800607P100 Metal film: 10 ohms ±5%, 178 w. R511 198800607P102 Metal film: 22K ohms ±5%, 178 w. R201 198800607P100 Metal film: 10 ohms ±5%, 178 w. R516 198800607P102 Metal fi	L202	19A705470P5	Coil, Fixed: 22 nH; sim to Toko 380NB-22nM.	R418	1986006079681	Metal film: 680 onms $\pm 5\%$, 1/8 w.
L301 19A/054/0P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. 19B800607P103 Metal film: 10K chms ±5%, 1/8 w. L501 19A705470P8 Coil, Fixed: 39 nH; sim to Toko 380NB-39nM. R421 19B800607P103 Metal film: 10K chms ±5%, 1/8 w. Q302 19A70076P2 Silicon, NPN: sim to MdBT3904, low profile. R503 19B800607P103 Metal film: 100K chms ±5%, 1/8 w. Q301 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R504 19B800607P104 Metal film: 100K chms ±5%, 1/8 w. Q301 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R506 19B800607P104 Metal film: 100K chms ±5%, 1/8 w. Q705 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 19B800607P104 Metal film: 100K chms ±5%, 1/8 w. R1 19B800607P1050 Metal film: 10 ohms ±5%, 1/8 w. R511 19B800607P103 Metal film: 100 chms ±5%, 1/8 w. R2 19B800607P104 Metal film: 10 ohms ±5%, 1/8 w. R513 19B800607P102 Metal film: 22K chms ±5%, 1/8 w. R201 19B800607P104 Metal film: 10 ohms ±5%, 1/8 w. R514 19B800607P102 Metal film: 22K chms ±5%, 1/8 w. R204 19B800607P104 Metal film: 10 ohms ±	L203	344A4540P100	Inductor, surface mount: 10 nH \pm 5%.	R419	19B800607P103	Metal film: 10K onms $\pm 5\%$, 1/8 W.
L501 19A705470P8 Coli, Fixed: 39 nH; sim to Toko 380NB-39nM. R421 198800607P103 Metal film: 10K ohms ±5%, 1/8 w. Q301 19A149542P2 Silicon, PNP: sim to Motorola MJD32C. 198800607P104 Metal film: 10K ohms ±5%, 1/8 w. Q301 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R504 198800607P104 Metal film: 10K ohms ±5%, 1/8 w. Q401 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. R505 198800607P104 Metal film: 10K ohms ±5%, 1/8 w. Q701 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 198800607P104 Metal film: 10K ohms ±5%, 1/8 w. Q705 Silicon, NPN: sim to MMBT3904, low profile. R507 198800607P103 Metal film: 10K ohms ±5%, 1/8 w. R1 198800607P100 Metal film: 51 ohms ±5%, 1/8 w. R511 198800607P101 Metal film: 10 ohms ±5%, 1/8 w. R2 198800607P100 Metal film: 10 ohms ±5%, 1/8 w. R514 198800607P101 Metal film: 20 khms ±5%, 1/8 w. R201 198800607P100 Metal film: 10 ohms ±5%, 1/8 w. R516 198800607P102 Metal film: 10 ohms ±5%, 1/8 w. R202 198800607P100 Metal film: 10 ohms ±5%, 1/8 w. R516	L301	19A705470P8	Coll, Fixed: 39 nH; sim to Toko 380NB-39nM.	R420	19B000007F154	Metal film: 10K chma 15%, 1/8 w.
Case Instantian Instantis Instantis	L501	19A705470P8	Coil, Fixed: 39 nH; sim to Toko 380NB-39nM.	R421	19B800607P103	Metal film: 10K onms ±5%, 1/8 w.
Q301 19A149542P2 Silicon, PNP: sim to MMBT3904, low profile. R503 19B800607P150 Metal film: 100K ohms ±5%, 1/8 w. Q401 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R504 19B800607P104 Metal film: 100K ohms ±5%, 1/8 w. Q501 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. R504 19B800607P104 Metal film: 100K ohms ±5%, 1/8 w. Q701 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 19B800607P104 Metal film: 100K ohms ±5%, 1/8 w. Q705 Silicon, NPN: sim to MMBT3904, low profile. R501 19B800607P104 Metal film: 100K ohms ±5%, 1/8 w. R1 19B800607P510 Metal film: 51 ohms ±5%, 1/8 w. R511 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w. R201 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R516 19B800607P102 Metal film: 22K ohms ±5%, 1/8 w. R202 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w. R516 19B800607P102 Metal film: 22K ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w. R516 19B800607P102 Metal film: 100 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w				R502	19B800607P103	Metal film: TOK Offins $\pm 5\%$, 1/8 w.
Q301 19A14942P2 Silicon, PNF: sim to MMBT3904, low profile. Q302 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. Q401 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. Q701 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. Q701 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. Q701 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. Q705 Silicon, NPN: sim to MMBT3904, low profile. R506 Q706 19B800607P104 Metal film: 10K ohms ±5%, 1/8 w. R6 19B800607P510 Metal film: 51 ohms ±5%, 1/8 w. R6 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R6 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R20			TRANSISTORS	R503	1988006078224	Metal film: $45 \text{ chms} + 50(-4/9)$ w
Q302 19A700076P2 Silicon, NPN: sim to MMB13904, low profile. R505 198800607P104 Metal film: 100K 0hm ±15%, 1/8 w. Q401 19A700076P2 Silicon, NPN: sim to MMB13904, low profile. R506 198800607P104 Metal film: 200K ohms ±5%, 1/8 w. Q701 19A700076P2 Silicon, NPN: sim to MMB13904, low profile. R506 198800607P104 Metal film: 100K ohms ±5%, 1/8 w. Q705 Silicon, NPN: sim to MMB13904, low profile. R507 198800607P104 Metal film: 100K ohms ±5%, 1/8 w. R7 Silicon, NPN: sim to MMB13904, low profile. R506 198800607P104 Metal film: 100K ohms ±5%, 1/8 w. R7 Metal film: 51 ohms ±5%, 1/8 w. R511 198800607P101 Metal film: 100 ohms ±5%, 1/8 w. R2 P8800607P100 Metal film: 10 ohms ±5%, 1/8 w. R511 198800607P102 Metal film: 22 K ohms ±5%, 1/8 w. R201 198800607P100 Metal film: 10 ohms ±5%, 1/8 w. R516 198800607P102 Metal film: 20 kms ±5%, 1/8 w. R202 198800607P101 Metal film: 10 ohms ±5%, 1/8 w. R517 198800607P102 Metal film: 4.7K ohms ±5%, 1/8 w. R204 198800607P150 Metal film: 100 ohms ±5%, 1/8 w. R517 R518 19880	Q301	19A149542P2	Silicon, PNP: sim to Motorola MJD32C.	R304	19B000007F150	Metal film: 100K obmo $\pm 5\%$, 1/8 w
Q401 19A704708P2 Silicon, NPN: sim to NEC 25C3356. R306 19B800607P104 Metal film: 220K 0fms ±5%, 1/8 w. Q501 19A70076P2 Silicon, NPN: sim to MMBT3904, low profile. R507 19B800607P104 Metal film: 100K ohms ±5%, 1/8 w. Q705	Q302	19A700076P2	Silicon, NPN: sim to MMB13904, low profile.	RSUS	19B000007F104	Metal film: 220K ohmo 15%, 1/8 w.
Q501 19A700076P2 Silicon, NPN: sim to MMBT3904, low profile. Nov p	Q401	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.	R506	19B800607P224	Metal film: 220K onns ±5%, 1/8 w.
GV01 19A700076P2 Silicon, NPN: sim to MMB13904, low profile. R509 19B800607P473 Metal film: 47K ohms ±5%, 1/8 w. R1 19B800607P510 Metal film: 51 ohms ±5%, 1/8 w. R510 19B800607P473 Metal film: 100 ohms ±5%, 1/8 w. R6 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R513 19B800607P100 Metal film: 22K ohms ±5%, 1/8 w. R6 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R515 19B800607P224 Metal film: 22K ohms ±5%, 1/8 w. R202 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R516 19B800607P102 Metal film: 22K ohms ±5%, 1/8 w. R203 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R516 19B800607P102 Metal film: 1K ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R517 R518 19B800607P472 Metal film: 4.7K ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R611 19A702931P176 Metal film: 24K ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w. R601 19A702931P176 Metal film: 24K ohms ±5%, 1/8 w. R213 19B800607P103 Metal film: 15 ohms ±5%, 1/8 w. </td <td>Q501</td> <td>19A700076P2</td> <td>Silicon, NPN: sim to MMBT3904, low profile.</td> <td>R507</td> <td>19B800607P104</td> <td>Metal film: 100K onms $\pm 5\%$, 1/8 w.</td>	Q501	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.	R507	19B800607P104	Metal film: 100K onms $\pm 5\%$, 1/8 w.
Q705	Q701 thru	19A700076P2	Silicon, NPN: sim to MMB13904, low profile.	R509	19B800607P473	Metal film: 4/K onms ±5%, 1/8 w.
R1 and R2 19B800607P510 Metal film: 51 ohms ±5%, 1/8 w. R6 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R6 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P100 Metal film: 20 ohms ±5%, 1/8 w. R202 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R203 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R203 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R205 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R205 19B800607P12 Metal film: 4.7K ohms ±5%, 1/8 w. R204 19B800607P151 Metal film: 100 ohms ±5%, 1/8 w. R205 19B800607P472 Metal film: 4.7K ohms ±5%, 1/8 w. R204 19B800607P151 Metal film: 100 ohms ±5%, 1/8 w. R205 19B800607P104 Metal film: 200 VDCW, 1/8 w. R214 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R214 19B800607P150 Metal fi	Q705			R510	19B800607P103	Metal film: 100 ohmo 15%, 1/8 w.
R1 and R2 19B800607P510 Metal film: 51 ohms ±5%, 1/8 w. R5 19B800607P510 Metal film: 10 ohms ±5%, 1/8 w. R6 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P180 Metal film: 18 ohms ±5%, 1/8 w. R202 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R203 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R203 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R205 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R206 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R207 19B800607P131 Metal film: 30 ohms ±5%, 1/8 w. R213 19B800607P130 Metal film: 13 ohms ±5%, 1/8 w. R214 19B800607P270 Metal film: 330 ohms ±5%, 1/8 w. R215 19B800607P270 Metal film: 30 ohms ±5%, 1/8 w. R216 19B800607P270 Metal fil			RESISTORS	Roll DE10	19B800607P101	Metal film: 100 onms ±5%, 1/8 w.
and R2 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R6 19B800607P180 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P180 Metal film: 18 ohms ±5%, 1/8 w. R202 19B800607P100 Metal film: 27 ohms ±5%, 1/8 w. R203 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R208 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w. R209 19B801486P101 Metal film: 100 ohms ±5%, 1/8 w. R213 19B800607P1331 Metal film: 330 ohms ±5%, 1/8 w. R214 19B800607P270 Metal film: 330 ohms ±5%, 1/8 w. R215 19B800607P270 Metal film: 330 ohms ±5%, 1/8 w. R216 19B800607P101 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 27 ohms ±5%, 1/8 w.	R1	19B800607P510	Metal film: 51 ohms ±5%, 1/8 w.	R512	196800607P473	Metal film: 47 K offins $\pm 5\%$, $1/8$ W.
R6 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R201 19B800607P180 Metal film: 18 ohms ±5%, 1/8 w. R202 19B800607P100 Metal film: 27 ohms ±5%, 1/8 w. R203 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w. R208 19B800607P151 Metal film: 100 ohms ±5%, 1/8 w. R209 19B801486P101 Metal film: 100 ohms ±5%, 1/8 w. R213 19B800607P150 Metal film: 330 ohms ±5%, 1/8 w. R214 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R215 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R216 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	and R2			R513	19B000007F100	Metal film: 2.21/ abma $\pm 50/$, 1/8 w.
R201 19B800607P180 Metal film: 18 ohms ±5%, 1/8 w. R202 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R203 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 10 ohms ±5%, 1/8 w. R208 19B800607P151 Metal film: 100 ohms ±5%, 1/8 w. R209 19B801486P101 Metal film: 100 ohms ±5%, 1/8 w. R213 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R214 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R215 19B800607P270 Metal film: 330 ohms ±5%, 1/8 w. R216 19B800607P101 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 27 ohms ±5%, 1/8 w.	R6	19B800607P100	Metal film: 10 ohms ±5% 1/8 w	R514	1968006076222	Metal film: 220K ohms ±5%, 1/8 w.
R201 19B800607P270 Metal film: 100 hms ±5%, 1/8 w. R203 19B800607P100 Metal film: 100 hms ±5%, 1/8 w. R204 19B800607P101 Metal film: 100 hms ±5%, 1/8 w. R208 19B800607P151 Metal film: 100 ohms ±5%, 1/8 w. R209 19B801486P101 Metal film: 100 ohms ±5%, 1/8 w. R213 19B800607P150 Metal film: 330 ohms ±5%, 1/8 w. R214 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R215 19B800607P270 Metal film: 330 ohms ±5%, 1/8 w. R216 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R216 19B800607P101 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R201	19B800607P180	Metal film: 18 ohms +5% 1/8 w	R515	19B000007F224	Metal film: $1/2$ above $1/50/2$ $1/9$ w
R203 19B800607P100 Metal film: 10 ohms ±5%, 1/8 w. R204 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w. R208 19B800607P151 Metal film: 100 ohms ±5%, 1/8 w. R209 19B801486P101 Metal film: 100 ohms ±5%, 1/8 w. R213 19B800607P150 Metal film: 330 ohms ±5%, 1/8 w. R214 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R215 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R216 19B800607P101 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R202	19B800607P270	Metal film: 27 ohms +5% 1/8 w	and	1968006079102	Metal him. TK onms ±5%, 1/8 w.
R204 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w. R208 19B800607P151 Metal film: 150 ohms ±5%, 1/8 w. R209 19B801486P101 Metal film: 100 ohms ±5%, 1/2 w. R213 19B800607P150 Metal film: 330 ohms ±5%, 1/8 w. R214 19B800607P331 Metal film: 15 ohms ±5%, 1/8 w. R215 19B800607P270 Metal film: 330 ohms ±5%, 1/8 w. R216 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R203	19B800607P100	Metal film: 10 ohms +5%. 1/8 w	R517		
R208 19B800607P151 Metal film: 150 ohms ±5%, 1/8 w. R209 19B801486P101 Metal film: 100 ohms ±5%, 1/2w. R213 19B800607P150 Metal film: 330 ohms ±5%, 1/8 w. R214 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R215 19B800607P231 Metal film: 330 ohms ±5%, 1/8 w. R216 19B800607P101 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R204	19B800607P101	Metal film: 100 ohms +5% 1/8 w	R518	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 w.
R209 19B801486P101 Metal film: 100 ohms ±5%, 1/2w. R213 19B800607P331 Metal film: 330 ohms ±5%, 1/8 w. R214 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R215 19B800607P231 Metal film: 330 ohms ±5%, 1/8 w. R216 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R208	19B800607P151	Metal film: 150 ohms +5%. 1/8 w	R601	19A702931P176	Metal film: 604 ohms \pm 1%, 200 VDCW, 1/8 w.
R213 19B800607P331 Metal film: 330 ohms ±5%, 1/8 w. R214 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R215 19B800607P331 Metal film: 330 ohms ±5%, 1/8 w. R216 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R209	19B801486P101	Metal film: 100 ohms +5% 1/2w	R602	19B800607P223	Metal film: 22K ohms ±5%, 1/8 w.
R214 19B800607P150 Metal film: 15 ohms ±5%, 1/8 w. R215 19B800607P331 Metal film: 330 ohms ±5%, 1/8 w. R216 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R213	19B800607P331	Metal film: 330 ohms +5% 1/8 w	R603	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R215 19B800607P331 Metal film: 330 ohms ±5%, 1/8 w. R216 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R214	19B800607P150	Metal film: 15 ohms +5% 1/8 w	R604	19B800607P470	Metal film: 47 ohms ±5%, 1/8 w.
R216 19B800607P270 Metal film: 27 ohms ±5%, 1/8 w. R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R215	19B800607P331	Metal film: 330 ohms +5% 1/8 w	R605	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R217 19B800607P101 Metal film: 100 ohms ±5%, 1/8 w.	R216	19B800607P270	Metal film: 27 ohms +5% 1/8 w			
	R217	19B800607P101	Metal film: 100 ohms +5% 1/8 w			

SYMBOL	PART NO.	DESCRIPTION
R606	19B800607P333	Metal film: 33K ohms ±5%, 1/8 w.
R607	19B800607P100	Metal film: 10 ohms ±5%, 1/8 w.
R608	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R609	19B800607P472	Metal film: 4.7K ohms ±5%. 1/8 w.
R610	19B800607P105	Metal film: 1M ohms ±5%, 1/8 w.
R611	19B800607P105	Metal film: 1M ohms +5%, 1/8 w.
R612	19B800607P184	Metal film: 180K ohms +5% 1/8 w
R701	19B800607P102	Metal film: 1K obms +5% 1/8 w
thru R706	1526666677 162	
R707 thru R709	19B800607P473	Metal film: 47K ohms ±5%, 1/8 w.
R710 thru R712	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R713	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R714	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R715	19B800607P473	Metal film: 47K ohms ±5% 1/8 w
R716	19B800607P103	Metal film: 10K ohms ±5% 1/8 w
R722	19B800607P473	Metal film: 47K ohms +5% 1/8 w
D722	1088006078201	Motal film: 200 obms $\pm 5\%$, 1/8 w
R723	19000007F391	Metal film: 1/ abma 15%, 1/8 w.
R724	1968006079102	Metal film: 27/ abma 15%, 1/8 W.
R725 thru R727	19B800607P273	Metal film: 27 K onms $\pm 5\%$, $1/8$ W.
R901	19B800607P121	Metal film: 120 ohms ±5%, 1/8 w.
R902	19B800607P331	Metal film: 330 ohms ±5%, 1/8 w.
R903	19B800607P150	Metal film: 15 ohms ±5%, 1/8 w.
R904	19B800607P331	Metal film: 330 ohms ±5%, 1/8 w.
R905	19B800607P151	Metal film: 150 ohms +5%, 1/8 w.
R906	19B800607P181	Metal film: 180 ohms +5%, 1/8 w.
R907	19B800607P271	Metal film: 270 obms ±5% 1/8 w
		INTEGRATED CIRCUITS
111	19A705537P2	Analog: MMIC, sim to Avantek MSA0886
11201	19A705927P1	Silicon bipolar: sim to Avantek MSA-0611
11202	344A3907P1	Analog: MMIC, sim to Avantek MSA1105
11203	194705927P1	Silicon bioolar: sim to Avantek MSA-0611
11201	10/20/02108	Voltage Regulator, Desitive: sim to Meterola
11202	10A116207P7	MC78M05CDT.
1401	1001400440201	Digital : Broscalor, sim to MC12022A
1402	1000000000	Synthesizer sustem: CMOS seriel input
0402	19000902F3	Linear: Duel On Amp; sim to LM259D
0403	19A702293F3	Linear. Dual Op Amp, sim to LM358D.
0501	19A702293P3	Linear: Dual Op Amp; sim to Livi358D.
0502	19A702705P4	4066BM.
U601	19A116297P7	Linear: Dual Op Amp; sim to MC4558CD.
U701	19A703483P302	Digital: Quad 2-Input NAND Gate; sim to 74HC00.
U702	19A703471P320	Digital: 3-Line To 8-Line Decoder; sim to 74HC138.
U705	19A703483P302	Digital: Quad 2-Input NAND Gate; sim to 74HC00.
U901	19A705927P1	Silicon, bipolar: sim to Avantek MSA-0611.
U902	RYT102217	Silicon, bipolar. Prescaler, divide by 2.
U903	19A705927P1	Silicon, bipolar: sim to Avantek MSA-0611.
		VOLTAGE REGULATORS
VR601 and VR602	19B235029P7	Variable Resistor: 5K, 0.5 W.





PIN I. RF INPUT 2. GROUND 3. RF OUTPUT AND BIAS 4. GROUND

U301 19A70497188 +5V Regulator



PIN	FUNCTION
i	INPUT
2	GROUND
3	OUTPUT

U902 RYT102217 Prescaler ÷2



U1 19A705537P2 U202 344A3907P1 Silicon Bipolar MMIC



U302 & U601 19A116297P7 **Dual Wide Band Op-Amp**

PIN CONNECTIONS



U401 19A149944P201 **Dual Modulus Prescaler**

FUNCTION TABLE		
SW MC DIVIDE RATIO		
Н	Н	64
н	L	65
L	н	128
L	L	129
SW: H = Vcc L = OPEN MC: H = 2.0V TO Vcc L = GND TO 0.8V		



U402 19B800902P5 Synthesizer

U502

19A702705P4

Quad Analog Switch









PIN CONFIGURATION

IN / OUT

9



PIN CONNECTION

1. Uş 2. Input

3. Bypass

4. GND

5. GND

7. Output

6. NC

8. NC



6





(1/4 OF DEVICE SHOWN)

ROL	SWITCH
	OFF
	ON

IC DATA

PIN ASSIGNMENT

14 VCC

A1 [1 •

U701 & U705 19A703483P302 Quad 2-Input NAND Gate



U702 19A703471P120 **Address Decoder**



^	1	U16		VCC
вĊ	2	15	þ	YO
⊂ ¢[]	3	14	D	Y1
G2A 🗌	4	13		Y2
G28 🗌	5	12		Y3
G1 🗌	6	11		Y4
Y7 🗌	7	10		Y5
סאס 🗋	8	9		Y6

FUNCTION TABLE

ENABLE SELECT INPUTS INPUTS			OUTPUTS										
G1	G2A	ĞΖΒ	C	в	Þ	YO	۲ı	Υ2	Υ3	٧4	¥5	YĠ	¥7
x	н	X	х	х	X	н	н	н	н	н	Н	н	н
×	X	н	×	x	x	н	н	н	н	н	н	н	н
ι.	x	x	х	x	x	н	н	н	н	н	н	н	н
н	L	L	L	E.	ι	L	н	н	н	Ħ	н	н	н
к	Ļ	L	L	L	н	н	٤	н	н	н	н	н	н
н	L	ι	L	н	ι	н	н	r,	ы	н	н	н	ы
н	L	L	L	н	н	к	н	н	L	Ħ	н	М	н
н	ι	L	н	L	L	к	н	н	н	L	н	н	н
н	L	Ł	н	L	н	н	н	н	н	н	L	н	н
н	£	f.	н	н	ι	н	н	н	н	н	н	L	н
н	L	ι	н	н	н.	н	н	н	н	н	н	н	L





LBI-39026

LEAD IDENTIFICATION FOR U301 (TOP VIEW) 2 GROUND

OUTPU



800 MHz TRANSMITTER SYNTHESIZER BOARD 19D902779G5

(19D902779, Sh. 3, Rev. 0)



19D902780G5

(19D902780, Sh. 2, Rev. 1)



19D902780G5



800 MHz TRANSMITTER SYNTHESIZER 19D902780G5

(19D904747, Sh. 2, Rev. 0)



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LBI-39026
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19D902780G5

(19D904747, Sh. 3, Rev. 0)