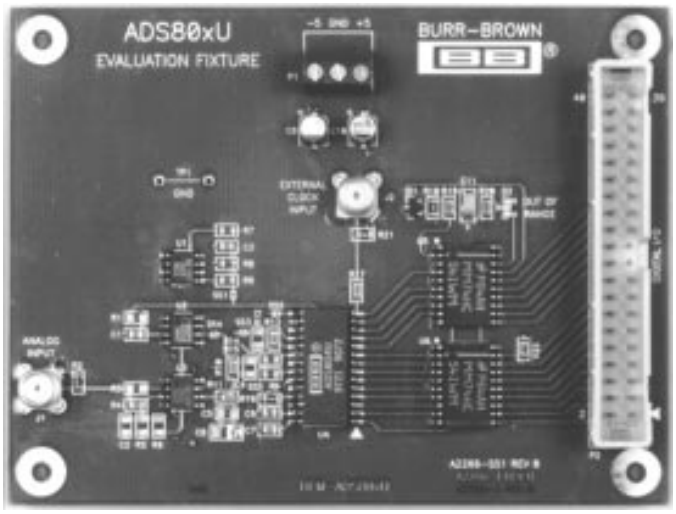
BURR - BROWN®

DEM-ADS80xU

EVALUATION FIXTURE



FEATURES

- **PROVIDES FAST AND EASY PERFORMANCE TESTING FOR ADS803/804/805**
- **AC- OR DC-COUPLED INPUTS**
- **INVERTING/NON-INVERTING INPUT CONFIGURATION**
- **ON-BOARD REFERENCE**
- **OUT OF RANGE INDICATOR**

DESCRIPTION

The DEM-ADS80xU evaluation fixture is designed for ease of use when evaluating the high speed analog-to-digital converter of the ADS80x family. It was designed to be the common evaluation platform for three of the models within the ADS80x family. The board will accommodate the 12-bit converter ADS803 (5Msps version) the ADS804 (10Msps), as well as the ADS805 the 20Msps model. Because of its flexible design the user can evaluate the converter in many different configurations: either with dc-coupled or ac-coupled input, internal or external reference with adjustable reference voltages.

The data outputs from the ADS9xx converter are decoupled from the connector via TTL-buffer.

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INITIAL CONFIGURATION

By using solder switches and resistor placements, the demonstration board, DEM-ADS80xU, can be set up in a variety of configurations to accommodate a specific model or function. Before starting an evaluation, the user should decide on the configuration and make the appropriate connections or changes. The demonstration board comes with the following factory set configurations:

- OPA642 set for a non-inverting configuration with a gain of +2V/V. R_3, R_4, R_6, C_2 are not assembled.
- Using capacitors C_5 and C_8 the output of the driver op amp OPA642 is AC-coupled to the converter input.
- The converter (U4) is set to operate with the internal reference. R_{13} (0Ω) is installed, setting the full-scale input range to 2Vp-p. The solder switch SS1 is open.
- The required common-mode voltage to bias the input of the ADS80x is derived by R_{14} and R_{15} and applied to pin 25 (U4) via R_{10} (0Ω).
- The bias for the complementary input of the ADS80x is developed in a similar fashion using R_{27}, R_{28}, R_{29}.

The evaluation board typically requires a ±5V supply unit. The negative supply is necessary to appropriately power the OPA642 used in the interface circuit. Selecting a different op amp like the OPA680, designed for simple supply applications, the evaluation board may be re-configured to operate with just a +5V supply.

INPUTS

DC-Coupled

The standard configuration of the evaluation board uses the high speed op amp OPA642, a voltage feedback type op amp that features very low distortion. In order to implement level shifting for the DC-coupled circuit configuration, op amp U3 needs to be reconfigured for inverting mode, with the level shifting voltage applied to the non-inverting input through R_6 and R_5. It is then also necessary to take out resistor R_4. To bypass some of the noise capacitor C_2 (0.1µF) should be inserted for this configuration. Note that in this case the input impedance to the board is also determined by the input resistor, R_3, and an appropriate termination resistor (R_2) value should be selected.

CLOCK

The DEM-ADS80xU requires an external TTL clock applied at SMA connector J2. This input represents a 50Ω input to the source. In order to preserve the specified performance of the ADS80x converter, the clock source should feature a very low jitter. This is particularly important if the converter is to be evaluated in an undersampling condition. The function of series resistor R_{17} is to dampen any excessive over- and undershoot of the applied clock pulse. It may be adjusted according to the amount of overshoot while maintaining a sufficiently fast rise and fall time.

EXTERNAL REFERENCE

The ADS80x converter can be operated with an external reference. Doing so solder switch SS3 must be closed applying 5V to the SEL-input (pin 18). This will disable the internal reference of U4. It is important to remove R_{13} before connecting the external reference voltage to the ADS80x, which is done by closing solder switch SS1. The reference voltage is generated using the on-board micro power reference IC, REF1004 (U1) and a general purpose single-supply op amp, OPA237 (U2). The actual reference voltage can be scaled by adjusting the values of resistors R_8 and R_9. The REF1004 produces a stable +2.5V voltage. The selected reference voltage determines the full-scale input signal range of the converter. For example, with V_{REF} = +1.25V, the input range will be 2.5Vp-p.

DATA OUTPUT

The data output is provided at CMOS logic levels. All ADS80x converters use straight offset binary coding. The data output pins of the converter are buffered from the connector, P2, by two CMOS octal buffers (HC or HCT541).

PC-BOARD LAYOUT

The DEM-ADS80xU consists of a four-layer PC board. To achieve the highest level of performance, surface-mount components are used wherever possible. This reduces the trace length and minimizes the effects of parasitic capacitance and inductance. The analog-to-digital converter is treated like an analog component. Therefore, the demo board has one consistent ground plane. Keep in mind that this approach may not necessarily yield optimum performance results when designing the ADS80x into different individual applications. In any case, thoroughly bypassing the power supply and reference pins of the converter, as demonstrated on the evaluation board, is strongly recommended.

For further application details please refer to the individual data sheets.

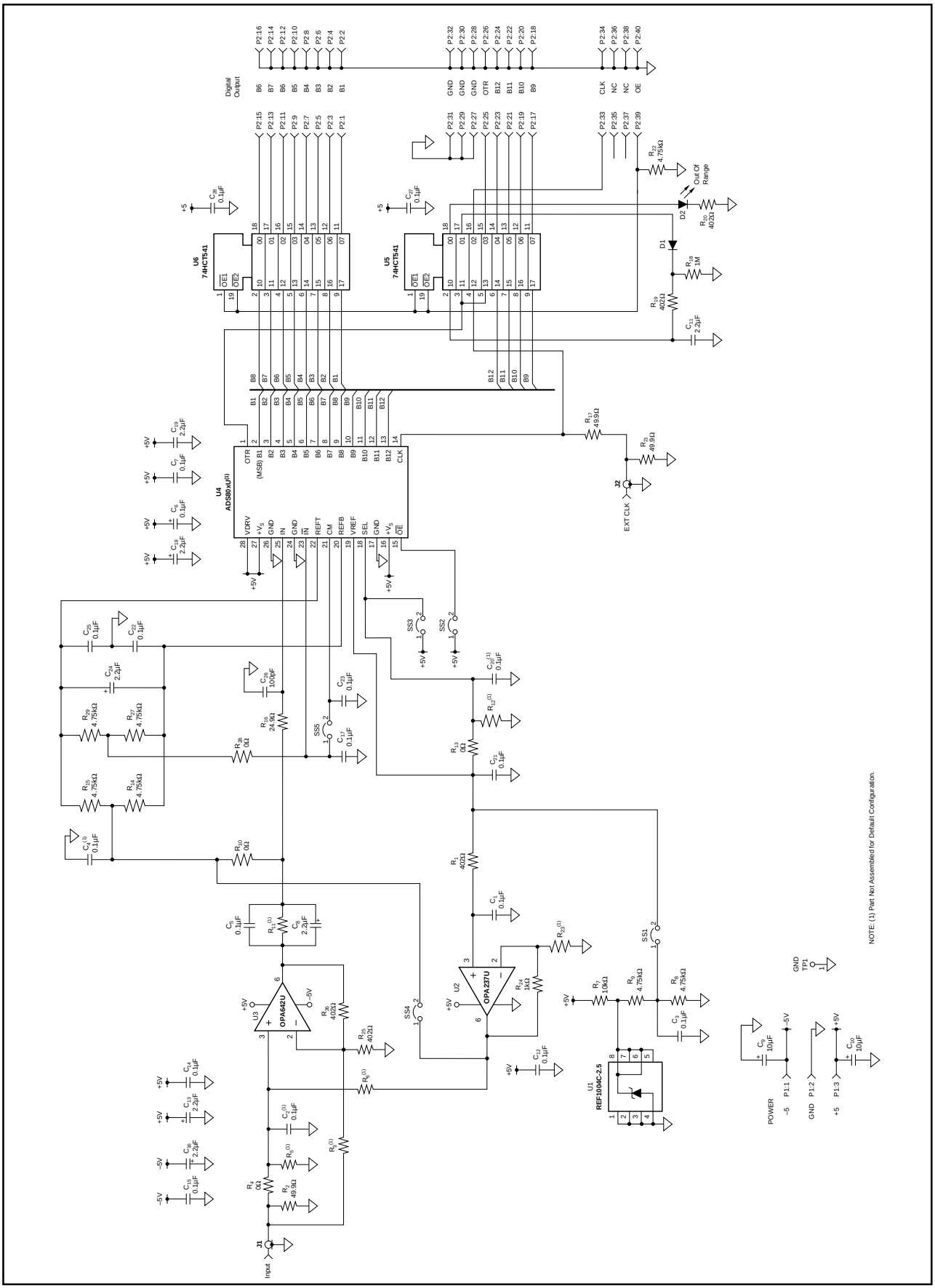

FIGURE 1. Circuit Schematic DEM-ADS80xU.

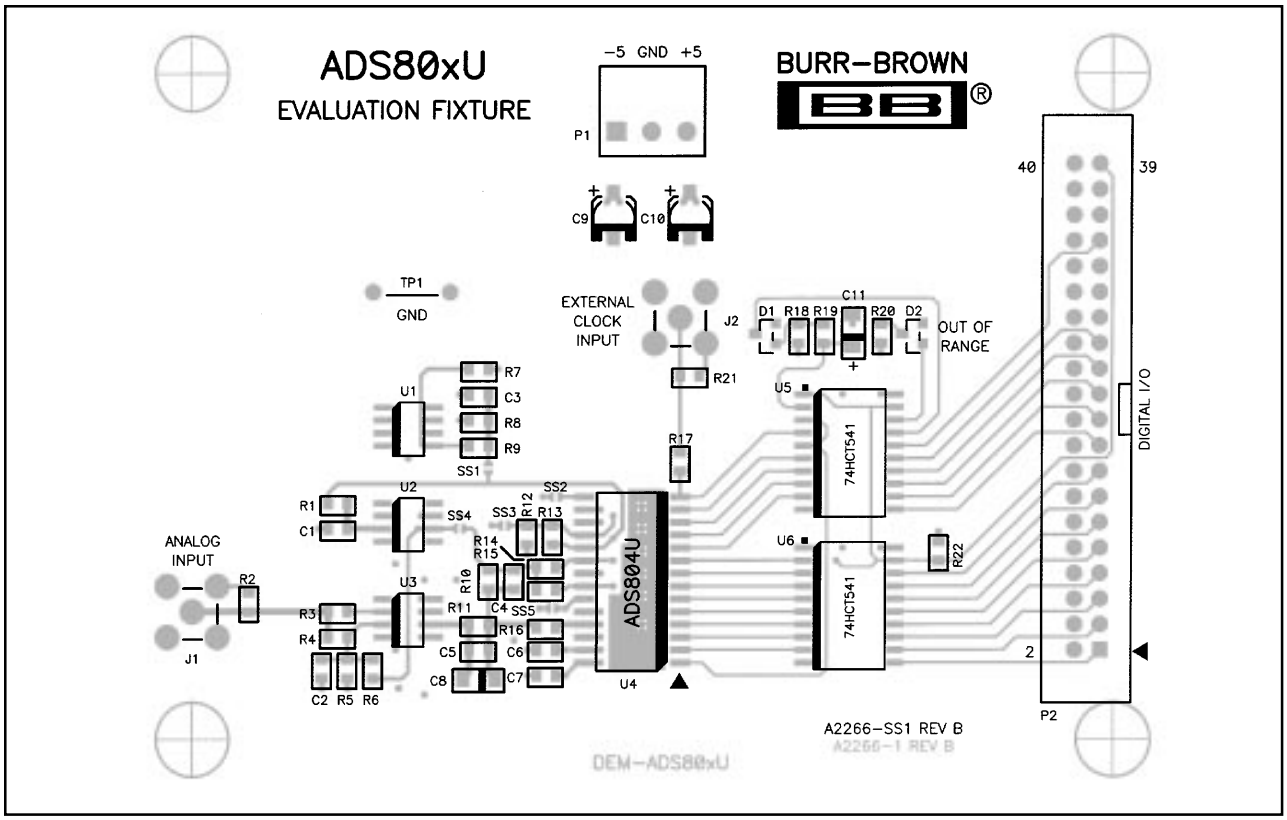

FIGURE 2. Top Layer (Component Side) with Silk-Screen.

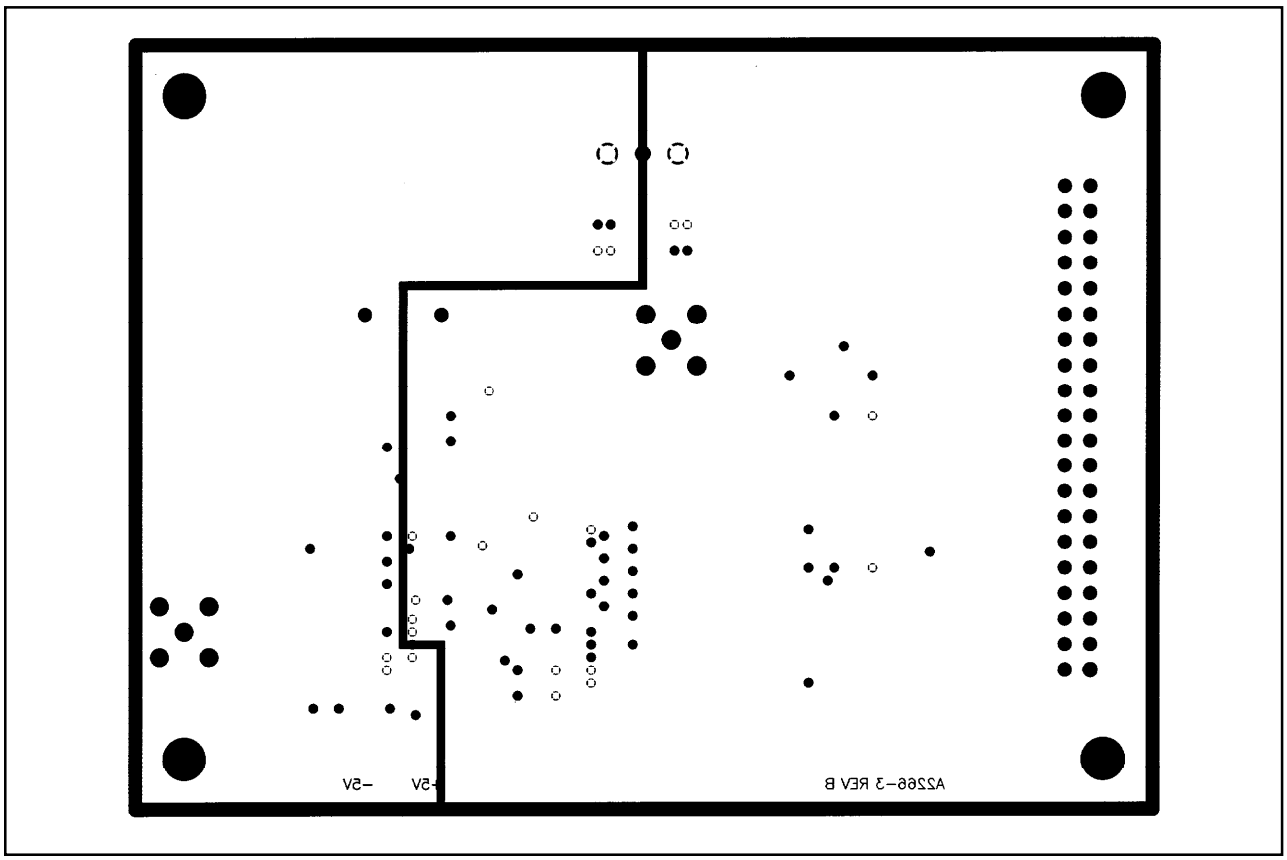

FIGURE 3. Power Plane.

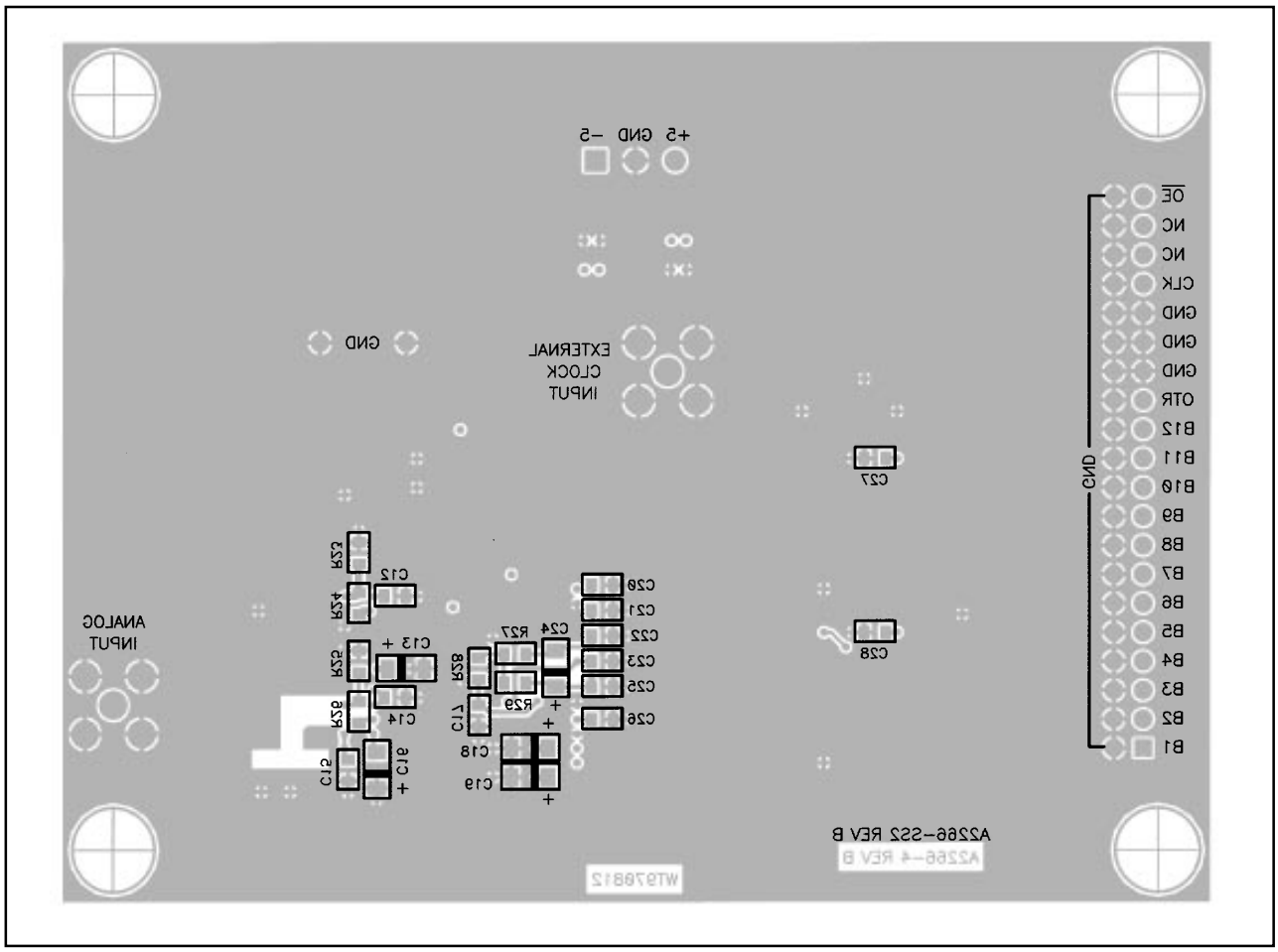

FIGURE 4. Bottom Layer with Silk-Screen.

COMPONENT LIST

REFERENCE	QTY	COMPONENT	DESCRIPTION	MANUFACTURER
U1	1	REF1004C-2.5	2.5V Reference, SO-8	Burr-Brown
U2	1	OPA237U	Single Op Amp, SO-8	Burr-Brown
U3	1	OPA642U	Low-Dist. Wideband Single Op Amp, SO-8	Burr-Brown
U4	1	ADS80xU	High-Speed ADC, 28-Pin SOIC	Burr-Brown
U5, U6	2	74HCT541	5V Octal Buffer, 20-Pin SOIC	
D1	1	BAS16	Diode, SOT-23	Philips
D2	1	SSL-LX15IG-TR	LED-Diode, Red, SOT-23	Lumex (Digi-Key)
R4, 10, 13, 28	1	CRCW0805ZEROF	0Ω, MF 0805 Chip Resistor, 1%	Dale
R16	1	CRCW080524R9F	24.9Ω, MF 0805 Chip Resistor, 1%	Dale
R2, 17, 21	3	CRCW080549R9F	49.9Ω, MF 0805 Chip Resistor, 1%	Dale
R1, 19, 20, 25, 26	5	CRCW08054020F	402Ω, MF 0805 Chip Resistor, 1%	Dale
R8, 9, 14, 15, 22, 24, 27, 29	8	CRCW08054751F	4.75Ω, MF 0805 Chip Resistor, 1%	Dale
R7	1	CRCW08051002F	10Ω, MF 0805 Chip Resistor, 1%	Dale
R18	1	CRCW08051005F	1MΩ, MF 0805 Chip Resistor, 1%	Dale
R3, 5, 6, 11, 12, 23	6		Open, Use Depends on Configuration	—
C9, C10	2	ECE-V1CV100SR	10µF/16V, Surface Mount Polar. Alu Cap.	Panasonic (Digi-Key)
C8, 11, 13, 16, 18, 19, 24	7	TAJR225006	2.2µF/10V, 3216 Tantalum Capacitor	AVX
C1, 3, 5, 6, 7, 12, 14, 15				
17, 21, 22, 23, 25, 27, 28	15	08055C104KAT	0.1µF/50V X7R 0805 Ceramic Capacitor	AVX
C26	1	08055C101KAT	100pF/50V NP0 0805 Ceramic Capacitor	AVX
C2, 4, 20	3		Open, Use Depends on Configuration	—
P1	1	ED555/3DS	3-Pin Term Block	On-Shore Technology
P2	1	IDH-40LP-S3-TG	20 x 2 Dual-Row Shrouded Header	Robinson-Nugent
J1, J2	2	142-0701-201	Straight SMA PCB Connector	EF Johnson
	4	1-SJ5003-0-N	Rubber Feet, Black, 0.44 x 0.2	Digi-Key
	1	PCBA 2266	PC Board A2266, Rev. B	Burr-Brown