

MAX20754 Evaluation Kit

Evaluates: MAX20754 and MAX20766

General Description

This evaluation kit demonstrates the MAX20754 PMBus™ compatible, dual-output, multiphase power-supply controller. The controller generates six pulse-width modulated (PWM) control signals, or “phases.” The MAX20754 evaluation kit (EV kit) is a two-output design, with four phases assigned to output 1 and the remaining two phases assigned to output 2. Both outputs use coupled inductor topologies. Coupled inductors reduce the effective inductor value and size without excessive ripple current, reducing required output capacitance, and improving transient response.

The EV kit also demonstrates the MAX20766 power-stage device. There are six MAX20766 devices, one per phase.

Features

- Optimized for Single +10V to +16V Supply
 - Onboard +3.3V Regulator (MAX17501)
- Generates Two Independent Outputs
 - Output 1: 4-Phase, 1V, 100A
 - Output 2: 2-Phase, 1V, 50A
- 500kHz Switching Frequency
- Independent Enable Switches
- PMBus Configuration and Control
 - Compatible with Maxim’s PowerTool™ GUI
 - Easy Connection to PC Using MAXPOW-ERTOOL002# (order separately)
- Status LEDs
 - Power-Good
 - Power-Stage Fault
 - SMBus Alert
- Proven PCB Layout
- Compensation Scheme Optimized for High Bandwidth
- Fully Tested and Assembled

Quick Start

Required Equipment

- 12V DC power supply capable of delivering 250W at the desired input voltage
- Windows PC with a spare USB port
- MAXPOWERTOOL002# USB to SMBus Interface (order separately)
- Maxim Digital PowerTool GUI software

Optional Equipment

- AC/DC “wall adapter” for convenient low-power evaluation, connecting to J5 on the EV kit. For example:
 - CUI p/n ETSA120500UC-P5P-SZ (12V, 5A, 60W max)
 - CUI p/n EMSA120300-P5P-SZ (12V, 3A, 40W max)
- 300MHz four-channel oscilloscope
- BNC-to-SMB cables for convenient, low-noise oscilloscope connection to the input and output voltage sense points. For example: CD International Technology p/n BSB-174TPR-3.
- Electronic load capable of sinking 100A at 1V
 - Two loads are required to test both outputs simultaneously
 - Ask about the Maxim MINILOAD device
- Digital multimeter (DMM)

Ordering Information appears at end of data sheet.

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PowerTool is a trademark of Maxim Integrated Products, Inc.

Procedure

Note: In the following sections, text in **bold** refers to items directly from the EV kit software.

The EV kit is fully assembled and tested. Follow the steps below to verify board operation. Caution: Do not turn on the power supply until all connections are completed.

- 1) Visit www.the-maxim-integrated.com to download and install the latest version of the Digital PowerTool Software.
- 2) Connect the USB cable from the PC to the MAX-POWERTOOL002# interface adapter.
- 3) Connect the adapter ribbon cable to the matching header J13 on the EV kit, ensuring that J13-Pin 1 is adjacent to the red wire on the ribbon cable.
- 4) Connect the DC power supply positive lead to J6 and the negative lead to J7 (or use an AC-DC adapter through J5 using a center-positive 2.1mm I.D. x 5.5mm O.D. plug).
- 5) If available, connect the electronic load(s) to the outputs at screw terminals ST1, ST2, ST3, and ST4, being careful to observe the VOUT and GND polarity indicated by the silkscreen labels.
- 6) If available, connect the oscilloscope to the EV kit for waveform analysis. Coaxial SMB cable connections J8, J9, and J10 allow low-noise measurement of the input and output ripple waveforms. (Note that the input voltage signal at J8 is resistively attenuated 20:1 to protect oscilloscope inputs.)
- 7) Ensure that jumpers JP1 and JP2 have shunts installed.
- 8) Enable the external 12V supply.
- 9) Enable the onboard MAX17501 12V-to-3.3V supply circuit with switch S5. This supplies 3.3V to the MAX20754, which in turn generates 1.8V power for the MAX20766 power stage devices.
- 10) Start the GUI software. The “Dashboard” window should appear, as shown in [Figure 1](#).
- 11) Enable the MAX20754 outputs by operating switches S2 and S3 on the EV kit, or by setting the OPERATION and ON_OFF_CONFIG commands in the PowerTool GUI.



Figure 1. Maxim PowerTool Graphical User Interface Software Dashboard Window

Detailed Description of Software

The PowerTool software presents system-level information on the **Dashboard** tab. This view collects basic information for all Maxim PMBus devices found on the bus. This tab configures sequencing and output voltage levels, and presents an overview of the system status. Clicking the **Stop Communication** button stops all PMBus transactions from the PowerTool GUI. To force detection of all active devices on the bus, click the **Search for Devices** button.

For detailed information on a particular device, click on the sub-tab for that device's slave address. This opens a view with a set of further sub-tabs specific to that device as shown in [Figure 2](#). The sub-tabs available vary depending on the GUI version and the connected device's capability, but typically include **Configuration**, **Monitor**, **Faults Set**, and **PMBus Command**.

The **Configuration** tab presents the most commonly used PMBus command data in human-readable form. The device status is updated by continuous polling of these commands. Configuration settings for an individual device can be saved to or restored from an external file. PMBus command settings can be saved to or restored from the device's internal nonvolatile memory as well.

The **Monitor** tab shows continuously updated telemetry data from the device. Rolling plots of output voltage, input voltage, output current, and temperature data are shown, including indication of fault limits relative to the operating point.

The **Faults Set** tab allows the user to configure and monitor the status of most protection and warning functions. The fault levels and fault response commands are configured from this tab. The full contents of the STATUS_ register commands are available by clicking the **View Fault/Warning bit by bit** button. Fault and warning flags are cleared by clicking the **Clear Fault/Warning** button, which sends the CLEAR_FAULTS PMBus command to the device.

The **PMBus Command** tab shows all supported PMBus commands in a series of sub-tabs, allowing detailed configuration and analysis of the command values. The user can view the command values in hexadecimal or decimal format by checking or clearing the **Force Hex** checkbox. The **Use PEC** checkbox enables or disables Packet Error Checking for all GUI communications. Note that the command data is continuously updated by polling; typing a new value into the text boxes causes the new value to be sent to the device.

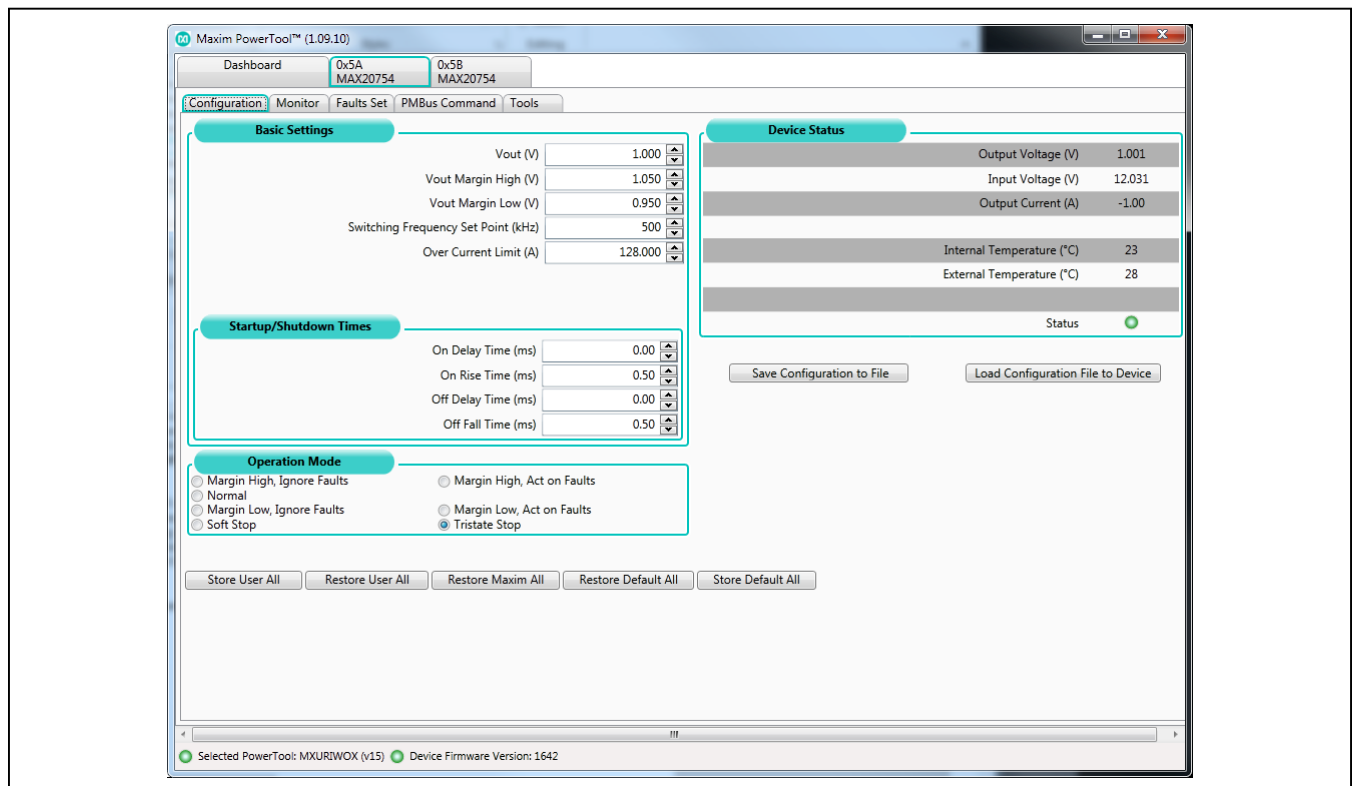


Figure 2. Detailed View for One Device; Configuration Sub-Tab

Detailed Description of Hardware

The MAX20754 EV kit demonstrates a dual-output step-down power supply solution, with one four-phase output and one two-phase output, both of which make use of coupled inductors. This solution provides high output-current with high efficiency, fast load-transient response, and low ripple and noise.

The MAX20754 controller automatically interleaves all PWM outputs assigned to a given output at even intervals. The first output is four-phase, resulting in 90° timing; the second output is two-phase, with 180° timing. Each PWM signal is connected to one MAX20766 dual power-stage device, operating in parallel configuration. This configuration is capable of supplying up to 25A per phase. Each power-stage is in turn connected to one winding of a coupled inductor.

The MAX20754 controller evenly shares the load current between phases in a given output. The EV kit is configured to operate both outputs at 500kHz fundamental switching frequency, but can be modified to operate anywhere from 300kHz to 800kHz with appropriate compensation network changes. Both outputs are set to supply 1V. The maximum output current for output 1 is 100A, and for output 2 is 50A.

The output voltage, output rise-time and fall-time, switching frequency, PMBus address, slope compensation, and maximum output current are set using only five external resistors, allowing simple setup and application configuration that does not require PMBus commands. Refer to the MAX20754 and MAX20766 integrated circuit data sheets for complete details on design and component selection.

Table 1. Jumper JP1

SHUNT POSITION	DESCRIPTION
Installed	MAX17501 +3.3V output connected to MAX20754 V _{DD3P3} input.
Not installed	MAX20754 can be powered by an external +3.3V supply at TP35.

Table 2. Jumper JP2

SHUNT POSITION	DESCRIPTION
Installed	MAX17501 +3.3V output connected to AUX3P3 rail (ENx debounce and status LED logic, etc.).
Not installed	The AUX3P3 rail can be powered by an external +3.3V supply at pin 2 of JP2.

Table 3. Connector List

REFERENCE DESIGNATOR	DESCRIPTION
J6	Input supply positive voltage (+5V to +16V)
J7	Input supply ground
ST1	Rail 1 output positive voltage
ST2	Rail 1 output ground
ST3	Rail 2 output positive voltage
ST4	Rail 2 output ground
J13	Header for connection to MAXPOWERTOOL002# USB to SMBus interface. Pin 1: SCL Pin 3: SDA Pin 7: ALERT Even-numbered pins: Ground
J8	SMB jack for input supply monitoring. This connection has a 1/20 resistive divider with 50Ω back-impedance. Connect to an oscilloscope with 20x scaling and ≥1MΩ input resistance.
J9	SMB jack for rail 1 output voltage monitoring. This connection has 50Ω back-impedance. Connect to an oscilloscope with 1x scaling and ≥1MΩ input resistance.
J10	SMB jack for rail 2 output voltage monitoring. This connection has 50Ω back-impedance. Connect to an oscilloscope with 1x scaling and ≥1MΩ input resistance.
J5	Alternate input supply barrel connector, 2.1mm I.D. x 5.5mm O.D. barrel jack, center-positive. Do not exceed 5A current.

Table 4. Switches

REFERENCE DESIGNATOR	FUNCTION
S5	SPDT toggle switch. Enable MAX17501 +3.3V buck regulator to supply VDD3P3 Green light: output enabled
S4	Momentary tactile switch; no function on MAX20754
S2	SPDT toggle switch. Enable Rail 1 output regulation. Green light: PGOOD1 pin high Amber light: ALERT pin asserted low Red light: FAULT pin asserted low (power stage fault detected)
S3	SPDT toggle switch. Enable Rail 2 output regulation. Green light: PGOOD2 pin high Amber light: ALERT pin asserted low Red light: FAULT pin asserted low (power stage fault detected)

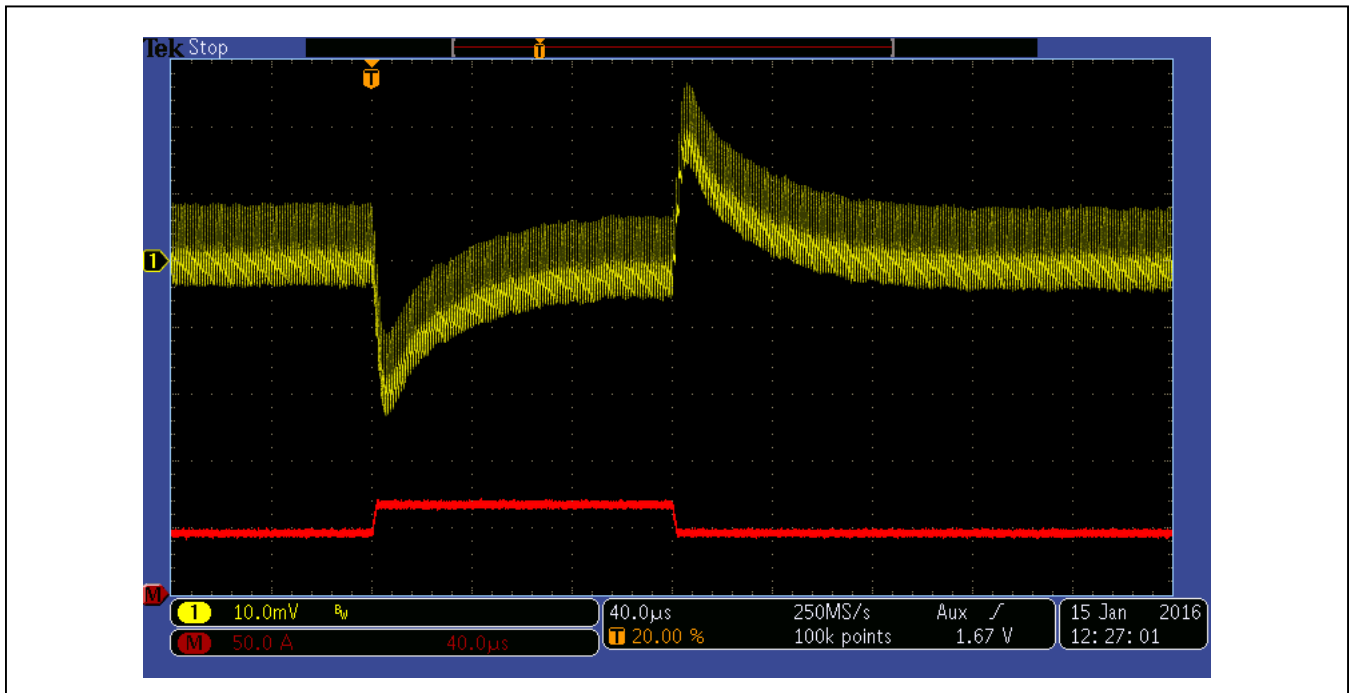
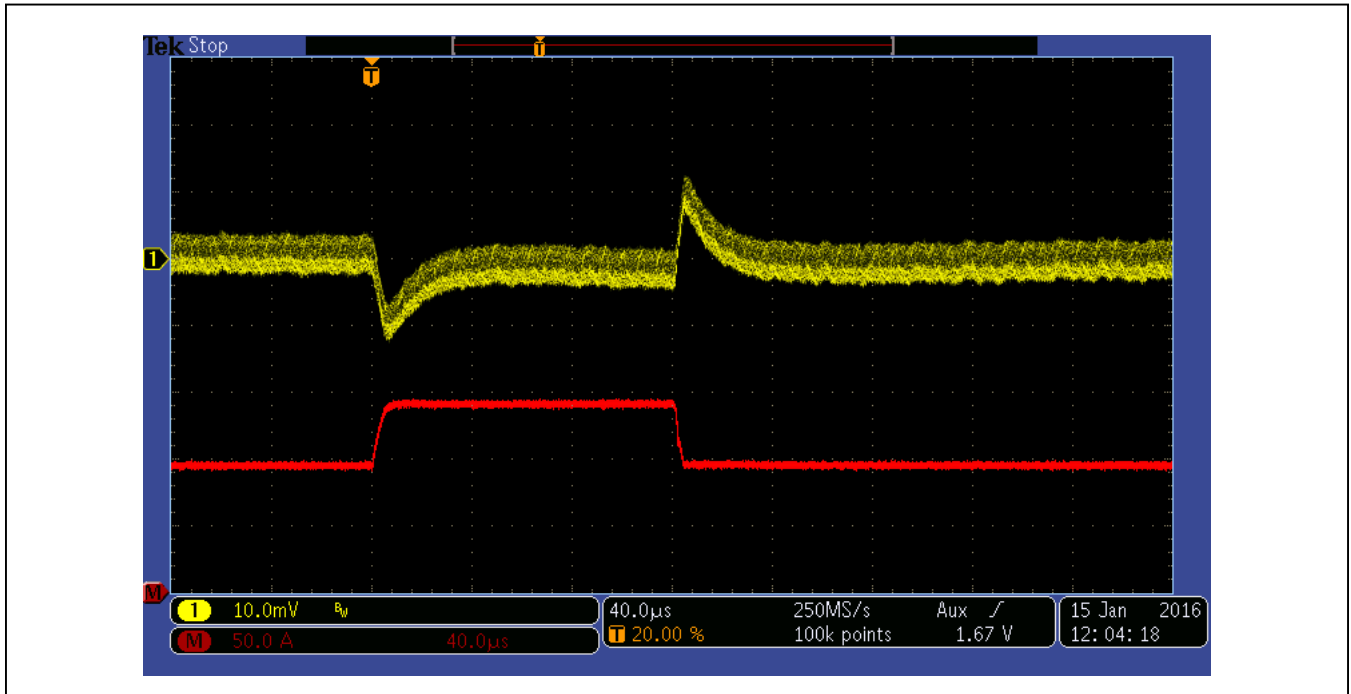
Table 5. Test Points

REFERENCE DESIGNATOR	DESCRIPTION
TP21	ALERT signal (open drain)
TP20	FAULT signal (open drain)
TP36	SDA signal (open-drain)
TP37	SCL signal (open-drain)
TP17	EN1 signal (open drain)
TP38	EN2 signal (open drain)
TP7	Input supply positive voltage
TP8	Input supply ground
TP19	Input voltage sense point for efficiency measurements
TP22	Input ground sense point for efficiency measurements
TP18	PGOOD1 signal (open drain)
TP40	PGOOD2 signal (open drain)
TP6	PWM0 signal (rail 2)
TP5	PWM1 signal (rail 1)
TP4	PWM2 signal (rail 1)
TP3	PWM3 signal (rail 1)
TP2	PWM4 signal (rail 1)
TP1	PWM5 signal (rail 2)
TP13	Rail 1 loop-response (Bode plot) measurement positive injection point (see Schematic)
TP23	Rail 1 loop-response (Bode plot) measurement negative injection point (see Schematic)
TP25	Rail 1 output voltage efficiency measurement point
TP26	Rail 1 output ground efficiency measurement point

Table 5. Test Points (continued)

REFERENCE DESIGNATOR	DESCRIPTION
TP9	Rail 1 output voltage feedback sense point (for line/load regulation accuracy measurement with DMM)
TP10	Rail 1 output ground feedback sense point (for line/load regulation accuracy measurement with DMM)
TP14	Rail 2 loop-response (Bode plot) measurement positive injection point (see Schematic)
TP24	Rail 2 loop-response (Bode plot) measurement negative injection point (see Schematic)
TP27	Rail 2 output voltage efficiency measurement point
TP28	Rail 2 output ground efficiency measurement point
TP11	Rail 2 output voltage feedback sense point (for line/load regulation accuracy measurement with DMM)
TP12	Rail 2 output ground feedback sense point (for line/load regulation accuracy measurement with DMM)
TP34	V _{DDS} supply; +1.8V power to MAX20766 power stage, from MAX20754 integrated switcher output
TP35	V _{DD3P3} supply; +3.3V power to MAX20754 integrated switcher
TP29, TP30, TP31, TP32, TP33, TP39	Ground

Typical Operating Characteristics



Typical Operating Characteristics (continued)

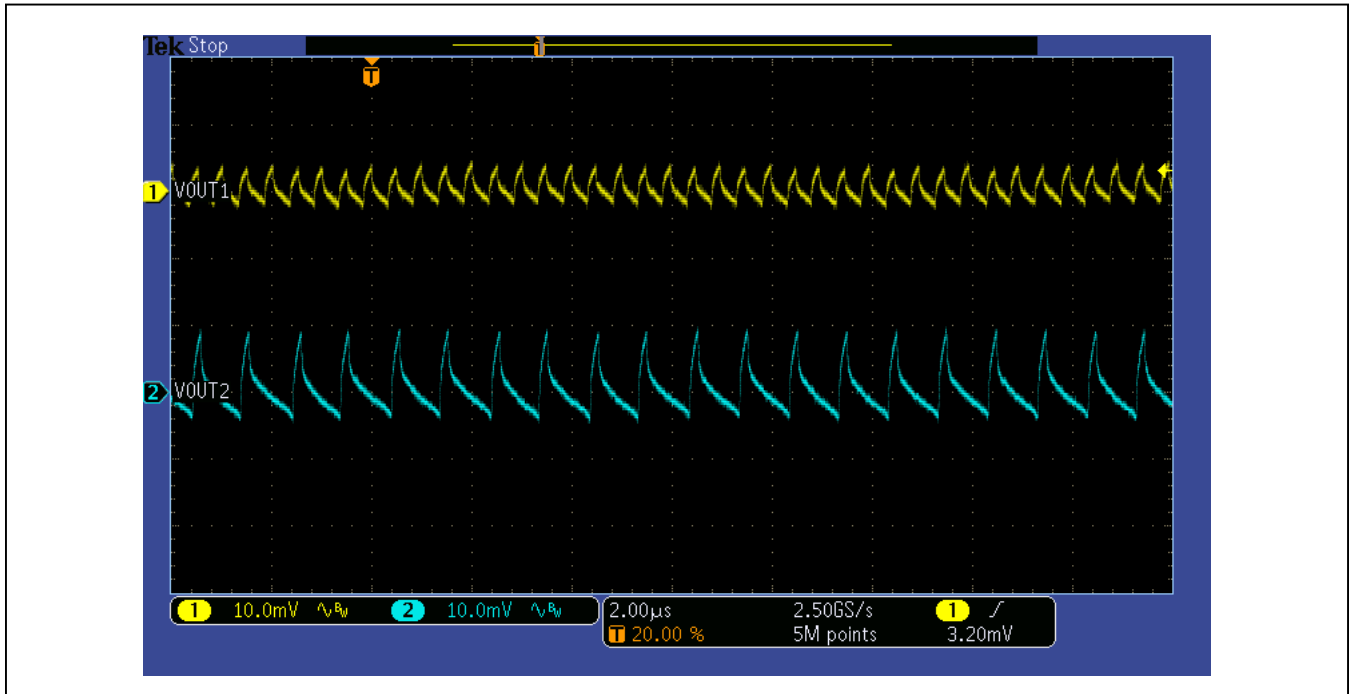


Figure 5. Output 1 and Output 2 Ripple

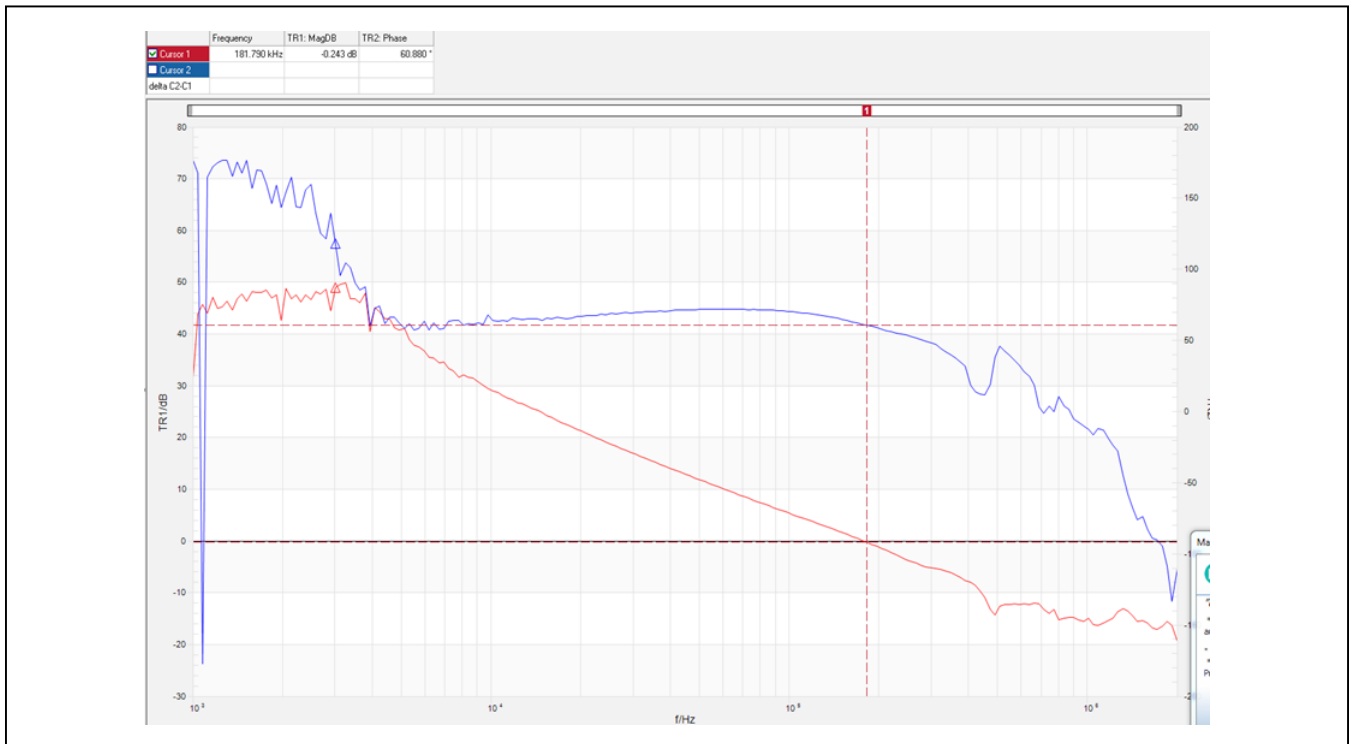


Figure 6. Output 1 Bode Plot

Typical Operating Characteristics (continued)

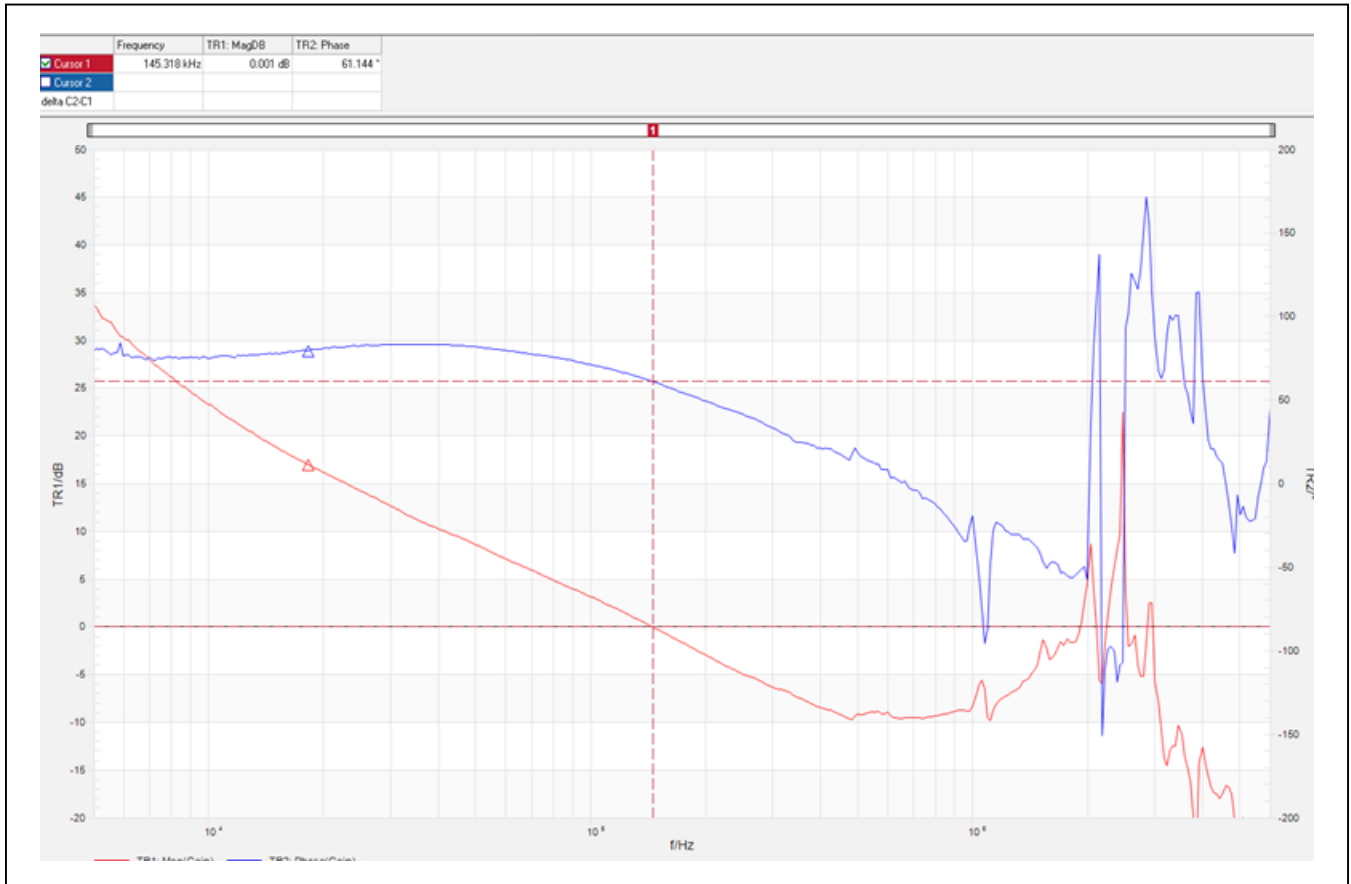


Figure 7. Output 2 Bode Plot

Typical Operating Characteristics (continued)

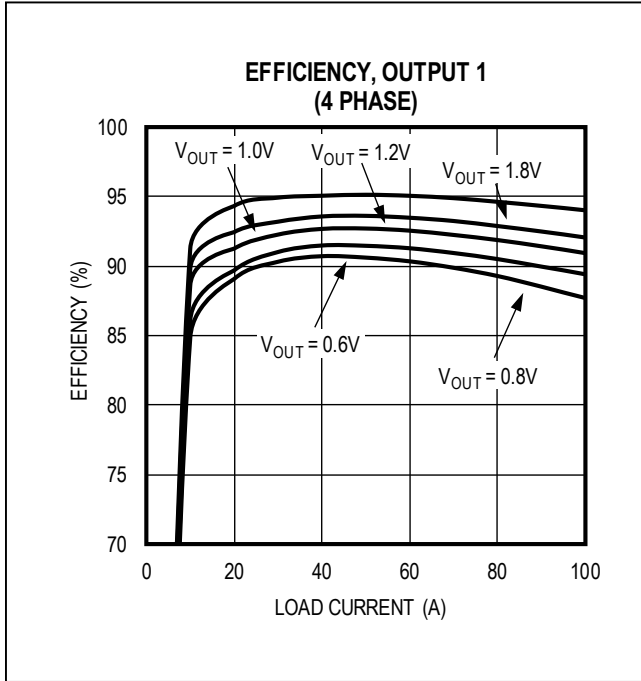


Figure 8. Output 1 Efficiency

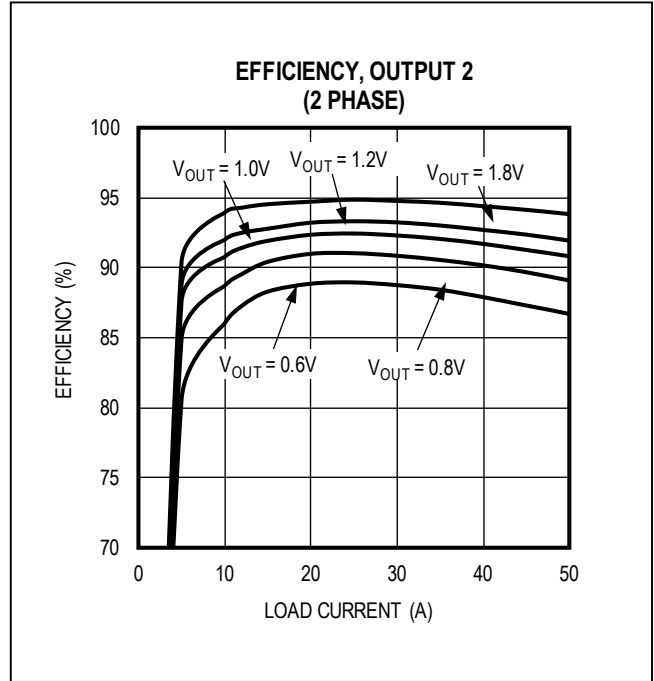


Figure 9. Output 2 Efficiency

Ordering Information

PART	TYPE
MAX20754EVKIT6#	MAX20754 EV Kit
MAXPOWERTOOL002#	USB-to-SMBus Interface

MAX20754 EV Kit Bill of Materials

ITEM	REF DES	DW	DNP	QTY	MFG PART #	MFG	VALUE	DESCRIPTION	COMMENTS
1	C1, C3-C5	-	-	4	GRM189C802Z26ME40	MURATA	22UF	CAPACITOR, SMT (0603); CERAMIC CHIP; 22UF; 4V; TOL=20%; TG=-55 DEGC TO +105 DEGC; TC=X6S	
2	C2, C6, C17, C18, C30, C31, C42, C50, C114-C116, C160-C165, C168, C189, C172, C173, C176, C177, C180, C181, C184, C185	-	-	27	C0402XTR160-104KNE	VENKEL LTD.	0.1UF	CAPACITOR, SMT (0402); CERAMIC CHIP; 0.1UF; 16V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=XTR;	
3	C7, C8, C90	-	-	3	C0402C1015GAC; NMC0402NPO1011; C0402JRNPO98N101; GRM1555C1H101JA01; C1005COG1H101J050BA; C042B2COG1H101J050BA	KEMET; NIC COMPONENTS CORP.; YAGEO PHICOMP; MURATA;TDK;TDK	100PF	CAPACITOR, SMT (0402); CERAMIC CHIP; 100PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=COG	
4	C8-C10, C26	-	-	4	GRM155R7H102JA01	MURATA	1000PF	CAPACITOR, SMT (0402); CERAMIC CHIP; 1000PF; 50V; TOL=5%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=XTR	
5	C11-C13, C15, C16	-	-	5	C0402C08016GAC; GRM1555C1H680JA01	KEMET; MURATA	88PF	CAPACITOR, SMT (0402); CERAMIC; 88PF; 50V; 5%; COG; -55degC to +125degC; 0 +/-30PPM/dgC	
6	C19, C20, C32, C33, C43, C51	-	-	6	GRM189R80U109KA01	MURATA	1UF	CAPACITOR, SMT (0603); CERAMIC CHIP; 1UF; 6.3V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +85 DEGC; TC=XSR;	
7	C21, C22, C35, C36, C44, C53	-	-	6	GRM155R7C22KA12	MURATA	0.22UF	CAPACITOR, SMT (0402); CERAMIC; 0.22UF; 16V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=XTR	
8	C25	-	-	1	GRM155R7H122KA01	MURATA	1200PF	CAPACITOR, SMT; 0402; CERAMIC; 1200PF; 50V; 10%; XTR; -55degC to +125degC; 0 +/-15% degC MAX.	
9	C27, C89, C103-C111, C117, C118	-	-	13	C3216XSR1C476M160AB; GRM31CR6C476ME44	TDK; MURATA	47UF	CAPACITOR, SMT (1206); CERAMIC CHIP; 47UF; 16V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=XSR	
10	C28	-	-	1	GRM1555C1H221JA01	MURATA	220PF	CAPACITOR, SMT (0402); CERAMIC CHIP; 220PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=COG	
11	C29	-	-	1	TMK105B1682KVH	TAIYO YUDEN	6800PF	CAPACITOR, SMT (0402); CERAMIC CHIP; 6800PF; 25V; TOL=10%; TG=-55 DEGC TO +85 DEGC; TC=XSR; AUTO	
12	C37, C54	-	-	2	ECJ-0EB1E822K	PANASONIC	8200PF	CAPACITOR, SMT (0402); CERAMIC CHIP; 8200PF; 25V; TOL=10%; MODEL=ECJ SERIES; TG=-55 DEGC TO +125 DEGC; TC=XTR	
13	C40, C112	-	-	2	GRM189R70U109KA01; CL10B105K08NNMC	MURATA; SAMSUNG ELECTRONICS	1.0UF	CAPACITOR, SMT (0603); CERAMIC; 1UF; 6.3V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=XTR;	
14	C41	-	-	1	GRM155R7H332KA01	MURATA	3300PF	CAPACITOR, SMT (0402); CERAMIC CHIP; 3300PF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=XTR	
15	C46	-	-	1	C0402XTR500-182KNP	VENKEL LTD.	1800PF	CAPACITOR, SMT; 0402; CERAMIC; 1800PF; 50V; 10%; XTR; -55degC to +125degC; 0 +/-15% degC MAX.	
16	C49	-	-	1	C0402C220K39AC; GRM155R7E223KA61	KEMET; MURATA	0.022UF	CAPACITOR, SMT (0402); CERAMIC CHIP; 0.022UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=XTR	
17	C56, C62, C63, C65, C75-C88, C95-C101, C188-C202, C204-C211, C213-C222, C226-C234	-	-	67	C3216XSR0J107M160AB; GRM31CR60J107ME39	TDK;MURATA	100UF	CAPACITOR, SMT (1206); CERAMIC CHIP; 100UF; 6.3V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=XSR	
18	C57, C59	-	-	3	1S5EP330M	PANASONIC	330UF	CAPACITOR, THROUGH HOLE-RADIAL LEAD; ELECTROLYTIC-OSCON; 330UF; 50V; TOL=20%	
19	C60, C61, C149-C152	-	-	6	20TQC100MYF	PANASONIC	100UF	CAPACITOR, SMT (7343); TANTALUM CHIP; 100UF; 20V; TOL=20%; TG=-55 DEGC TO +105 DEGC LOW ESR	
20	C66, C67, C154-C159, C223	9	-	-	TS21X336M050ATE075	KEMET	33UF	CAPACITOR, SMT (7343-43); CONDUCTIVE POLYMER; 33UF; 50V; TOL=20%	
21	C68-C74, C91-C94, C203, C212	-	-	12	C0402C108K9BAC; GRM155R7E103KA01C1085XTR1E103K950BB	KEMET; MURATA; TDK	0.01UF	CAPACITOR, SMT (0402); CERAMIC CHIP; 0.01UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=XTR;	

MAX20754 EV Kit Bill of Materials (continued)

ITEM	REF_DES	DNP	QTY	MFG PART #	MFG	VALUE	DESCRIPTION	COMMENTS
22	C113, C225	-	2	GRM21BC81C106KA73	MURATA	10UF	CAPACITOR, SMT (0805); CERAMIC CHIP; 10UF; 16V; TOL=10%; TG=-55 DEGC TO +105 DEGC; TC>X6S	
23	C119, C130	-	12	GRM188R61C106KAAL	MURATA	10UF	CAPACITOR, SMT (0603); CERAMIC CHIP; 10UF; 16V; TOL=10%; TG=-55 DEGC TO +85 DEGC; TC>X6R	
	C166, C167, C170, C171, C174, C175, C178, C179, C182, C183, C186, C187	-	12	C0805X7R250-105KNE; TMM212BJ10; YUDEN; TAYO YUDEN; MURATA	VENKEL LTD; TAYO YUDEN; TAYO YUDEN; MURATA	1UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 1UF; 25V; TOL=10%; MODEL=; TG=-55 DEGC TO +125 DEGC; TC>X7R-	
25	D1, D3	-	3	MBRSS40T3G	ON SEMI	MBRSS40T3	DIODE, SCH; SURFACE MOUNT SCHOTTKY POWER RECTIFIER, SMC; PIV=40V; IF=5A	
26	J1, J3	-	3	UPS-08-01-01-L-RA	SAMTEC	UPS-08-01-01-L-RA	CONNECTOR; FEMALE; THROUGH HOLE; DUAL LEAF POWER HEADER; RIGHT ANGLE; 8PINS	
27	J5	-	1	PJ-1024H	CULINC.	PJ-1024H	CONNECTOR; FEMALE; THROUGH HOLE; DC POWER JACK; RIGHT ANGLE; 3PINS	
28	J6, J7	-	2	111-2223-001	EMERSON NETWORK POWER	111-2223-001	MACHINE SCREW; THUMBSCREW; BANANA; 1/4-32IN; 11/32IN; NICKEL PLATED BRASS	
29	J8, J10	-	3	131-3701-266	JOHNSON COMPONENTS	131-3701-266	CONNECTOR; MALE; THROUGH HOLE; SMB JACK VERTICAL PCB MOUNT; STRAIGHT; 5PINS	
30	J13	-	1	TSW-108-07-L-D	SAMTEC	TSW-108-07-L-D	CONNECTOR; THROUGH HOLE; TSW SERIES; STRAIGHT; 16PINS	
31	JPL, JP2	-	2	PCC02SAA	SULLINS	PCC02SAA	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 2PINS; -65 DEGC TO +125 DEGC	
32	L1	-	1	XAL-4020-122ME	COILCRAFT	1.2UH	INDUCTOR; SMT; SHIELDED; 1.2UH; TOL=+/-20%; 6.6A	
33	L2, L3, L6	-	3	CL1206-2-100TR-R	EATON POWERING BUSINESS WORLDWIDE	CL1206-2-100TR-R	INDUCTOR; SMT; 100NH; TOL=+/-20%; 56A	
34	L5	-	1	IPS6235-333MR	COILCRAFT	33UH	INDUCTOR; SMT; MAGNETICALLY SHIELDED; 33UH; TOL=+/-20%; 1.3A	
35	MECH-MECH4	-	4	NYLON STANDOFF, 6.32, 1/4	MAXIM	NYLON_STANDOFF_6.32_1/4	KIT; ASSY; STANDOFF; IPC; STANDOFF; FEMALE; THREADED; HEX; 6-32/14; NYLON; 1PC; SCREW; PHILIPAN6-32/14; NYLON; STANDOFF LENGTH: 0.50INCH (12.7MM)	
36	R1	-	1	2N7002	DIODES INCORPORATED; MICROELECTRONICS	2N7002	TRANS; NCH; SOT-23; PD=0.33W; IC=0.5A; VCEO=60V; -55 DEGC TO +150 DEGC	
37	R1	-	1	ERJ-3RQFR47	PANASONIC	0.47	RESISTOR; 0603; 0.47 OHM; 1%; 300PPM; 0.1W; THICK FILM	
38	R2, R64, R67, R68, R71, R110-R112	-	8	CROW04020000Z0EDHP; RCS04020000Z0	DRALORIC; WISHAY DALE	0	RESISTOR; 0402; 0 OHM; 0%; JUMPER; 0.2W; THICK FILM	
39	R3	-	1	CRCW040286R6FK	WISHAY DALE	806	RESISTOR; 0402; 806 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
40	R4	-	1	ERJ-2RKF1781	PANASONIC	1.78K	RESISTOR; 0402; 1.78K OHM; 1%; 100PPM; 0.10W; THICK FILM	
41	R5	-	1	CROW04021K33FK	WISHAY DALE	1.33K	RESISTOR; 0402; 1.33K OHM; 1%; 100PPM; 0.063W; THICK FILM	
42	R6	-	1	ERJ-2RKF6490	PANASONIC	649	RESISTOR; 0402; 649 OHM; 1%; 100PPM; 0.10W; THICK FILM	

MAX20754 EV Kit Bill of Materials (continued)

ITEM	REF. DES	DNI/ DNP	QTY	MFG PART #	MFG	VALUE	DESCRIPTION	COMMENTS
43	R7	-	1	CRCW040234K0FK	VISHAY DALE	34K	RESISTOR; 0402; 34K OHM; 1%; 100PPM; 0.063W; THICK FILM	
44	R8	-	1	CRCW04022K49FK	VISHAY DALE	2.49K	RESISTOR; 0402; 2.49K OHM; 1%; 100PPM; 0.063W; THICK FILM	
45	R9	-	1	CRCW040220K0FK	VISHAY DALE	20K	RESISTOR; 0402; 20K OHM; 1%; 100PPM; 0.063W; THICK FILM	
46	R10, R11, R25, R26, R41, R50	-	6	CRCW040210R0FK; 9C04021A10R0FL	VISHAY DALE; YAGEO	10	RESISTOR; 0402; 10 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
R13, R14, R38, R59, R84, R85, R88, 47	R90, R92, R93, R96, R99, R102	-	13	CRCW0402100KFK; RC0402FR-07100KL	VISHAY; YAGEO	100K	RESISTOR; 0402; 100K; 1%; 100PPM; 0.0625W; THICK FILM	
48	R16, R44	-	2	CRCW0402332R2FK	VISHAY DALE	332	RESISTOR; 0402; 332 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
49	R17, R45	-	2	CRCW0402402R2FK	VISHAY DALE	402	RESISTOR; 0402; 402 OHM; 1%; 100PPM; 0.063W; THICK FILM	
50	R18, R19, R35, R36, R46, R57, R61	-	7	CRCW04021K00FK; RC0402FR-071K; MCR01MZPF1001	VISHAY DALE; YAGEO PHICOMP; ROHM SEMI	1K	RESISTOR; 0402; 1K; 1%; 100PPM; 0.0625W; THICK FILM	
51	R20, R21, R37, R38, R47, R58	-	6	CRCW0402499R2FK	VISHAY DALE	499	RESISTOR; 0402; 499 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
52	R23	-	1	CRCW0402100R2FK; 9C04021A100RFL; RC0402FR-07100RL	VISHAY DALE; PANASONIC; YAGEO PHICOMP	100	RESISTOR; 0402; 100 OHM; 1%; 100PPM; 0.063W; THICK FILM	
53	R24	-	1	CRCW04022K21FK	VISHAY DALE	2.21K	RESISTOR; 0402; 2.21K; 1%; 100PPM; 0.0625W; THICK FILM	
54	R27	-	1	ERJ-2RKF-3320	PANASONIC	332	RESISTOR; 0402; 332 OHM; 1%; 100PPM; 0.10W; THICK FILM	
55	R34	-	1	CRCW0402787R2FK	VISHAY DALE	787	RESISTOR; 0402; 787 OHM; 1%; 100PPM; 0.063W; THICK FILM	
56	R40, R104, R105	-	3	CRCW0402150R2FK; 9C04021A150RFL	VISHAY DALE; YAGEO	150	RESISTOR; 0402; 150 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
57	R48	-	1	CRCW0402374K4FK	VISHAY DALE	37.4K	RESISTOR; 0402; 37.4K OHM; 1%; 100PPM; 0.063W; THICK FILM	
58	R49	-	1	CRCW04021K40FK; RC0402FR-071K4L	VISHAY DALE; YAGEO PHICOMP	1.4K	RESISTOR; 0402; 1.4K OHM; 1%; 100PPM; .16W; THICK FILM	
59	R61	-	1	CR0402-16W-7150FT; CRCW0402715R2FK	VENKEL LTD.; VISHAY DALE	715	RESISTOR; 0402; 715 OHM; 1%; 100PPM; 0.063W; THICK FILM	
60	R63, R54	-	2	CRCW04021R00FK	VISHAY DALE	1	RESISTOR; 0402; 1 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
61	R66	-	1	CR0402-16W-8870FT	VENKEL LTD.	887	RESISTOR; 0402; 887 OHM; 1%; 100PPM; 0.063W; THICK FILM	
62	R60, R63	-	2	RC0402JR-070RL; CR0402-16W-00RJT	YAGEO PHICOMP; VENKEL LTD.	0	RESISTOR; 0402; 0 OHM; 5%; JUMPER; 0.063W; THICK FILM	
63	R62	-	1	CRCW0402523R3FK	VISHAY DALE	52.3	RESISTOR; 0402; 52.3 OHM; 1%; 100PPM; 0.063W; THICK FILM	
64	R65, R69	-	2	CRCW0402499R2FK; DHP	VISHAY DALE; DALORIC	49.9	RESISTOR; 0402; 49.9 OHM; 1%; 100PPM; 0.2W; THICK FILM	

MAX20754 EV Kit Bill of Materials (continued)

ITEM	REF DES	DNP/ DNP	QTY	MFG PART #	MFG	VALUE	DESCRIPTION	COMMENTS
65	R66, R70	-	2	CRCW0512100RFK	WISHAY DALE	100	RESISTOR; 2512; 100 OHM; 1%; 100PPM; 1.0W; THICK FILM	
66	R66, R67, R64, R95	-	4	CRCW04022K00FKR73H1ETP201F	WISHAY DALE/COA SFEER	2K	RESISTOR; 0402; 2K; 1%; 100PPM; 0.0625W; THICK FILM	
67	R103, R106	-	2	CRCW0402221RFRK	WISHAY DALE	221	RESISTOR; 0402; 221 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
68	S2, S3, S5	-	3	G12JPCF	NKK SWITCHES	G12JPCF	SWITCH; SPDT; SMT; STRAIGHT; 28V; FULLY ILLUMINATED ULTRA-MINIATURE TOGGLE; RCOIL=0 OHM; RINSULATION=500M OHM; NKK SWITCHES	
69	S4	-	1	TL3301AF1600J	E-SWITCH	TL3301AF1600J 80QJ	SWITCH; SPST; SMT; STRAIGHT; 260V; 0.05A; TACT SWITCH; RCOIL=0 OHM; RINSULATION=500M OHM; E-SWITCH	
70	ST1-ST4	-	4	7808	KEYSTONE	7808	TERMINAL; BODY LENGTH=0.67IN; BODY WIDTH=0.47IN; HEIGHT=0.45IN; SCRW; BRASS	
71	SU1, SU2	-	2	SNT-100-BK-G	SAMTEC	SNT-100-BK-G	TEST POINT; SHUNT AND JUMPER; STR; TOTAL LENGTH=6.10MM; BLACK; INSULATION=GLASS FILLED POLYESTER; CONTACT=PHOSPHOR BRONZE	
72	TP1-TP6, TP36, TP37	-	8	5002	KEYSTONE	N/A	TEST POINT; PINDIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER	APAD
73	TP7, TP9, TP11, TP35	-	4	5010	N/A	5010	TESTPOINT WITH 1.80MM HOLE DIA; RED; MULTIPURPOSE	RED
74	TP13, TP14, TP23, TP24, TP17, TP38	-	6	5012	KEYSTONE	N/A	TEST POINT; PINDIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; WHITE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH	(TP13,TP14,TP23, TP24,BPAD) (TP17,TP38,WHITE)
75	TP18, TP40	-	2	5126	KEYSTONE	N/A	TEST POINT; PINDIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; GREEN; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH	APAD
76	TP19, TP25, TP27	-	3	5000	KEYSTONE	N/A	TEST POINT; PINDIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH	APAD
77	TP20	-	1	5013	KEYSTONE	N/A	TEST POINT; PINDIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; ORANGE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH	ORANGE
78	TP21	-	1	5014	KEYSTONE	N/A	TEST POINT; PINDIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; YELLOW; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH	YELLOW
79	TP22, TP26, TP28	-	3	5001	KEYSTONE	N/A	TEST POINT; PINDIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH	APAD
80	TP10, TP12, TP31, TP32, TP39, TP29, TP30	-	8	5011	KEYSTONE	N/A	TEST POINT; PINDIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH	(TP8,TP10,TP12, TP31,TP32,TP39, BLACK) (TP29,TP30,BLACK)
81	TP33, TP34	-	2	5127	KEYSTONE	N/A	TESTPOINT;PINDIA=0.125IN;TOTALLENGTH=0.445IN;BOARDHOLE=0.063IN;BLUE;PHOSPHORBRONZE WIRE SILVERPLATEFINISH;	(TP33,BLACK) (TP34,BLUE)
82	U1	-	1	MAX20754ETMA1+	MAXIM	MAX20754E TMA1+	EVKIT PART - IC; CTRL; DUAL-OUTPUT; CONFIGURABLE MULTIPHASE POWER-SUPPLY CONTROLLER WITH PMBUS INTERFACE AND INTERNAL BUCK CONVERTER; STANDARD PRODUCT; PACKAGE CODE: T4877-4; PACKAGE OUTLINE NO.: 21-0144; PACKAGE LAND PATTERN DRAWING NO.: 90-0130; TOFN48-EP	
83	U2-U7	-	6	MAX20766	MAXIM	MAX20766	EVKIT PART-IC; HPOFN16; MAX20766; PACKAGE OUTLINE: 21-0986	
84	U8	-	1	MAX17501EATB+	MAXIM	MAX17501E ATB+	IC; CONV; ULTRA-SMALL; HIGH-EFFICIENCY; SYNCHRONOUS STEP-DOWN DC-DC CONVERTER; TDFN10-EP	
85	U9, U10, U14	-	3	NC7VZ38K6X	FARCHILD SEMICONDUCTOR	NC7VZ38K BX	IC; NAND; TINY LOGIC UHS DUAL 2-INPUT NAND GATE; OPEN DRAIN OUTPUT; VSSOP8	

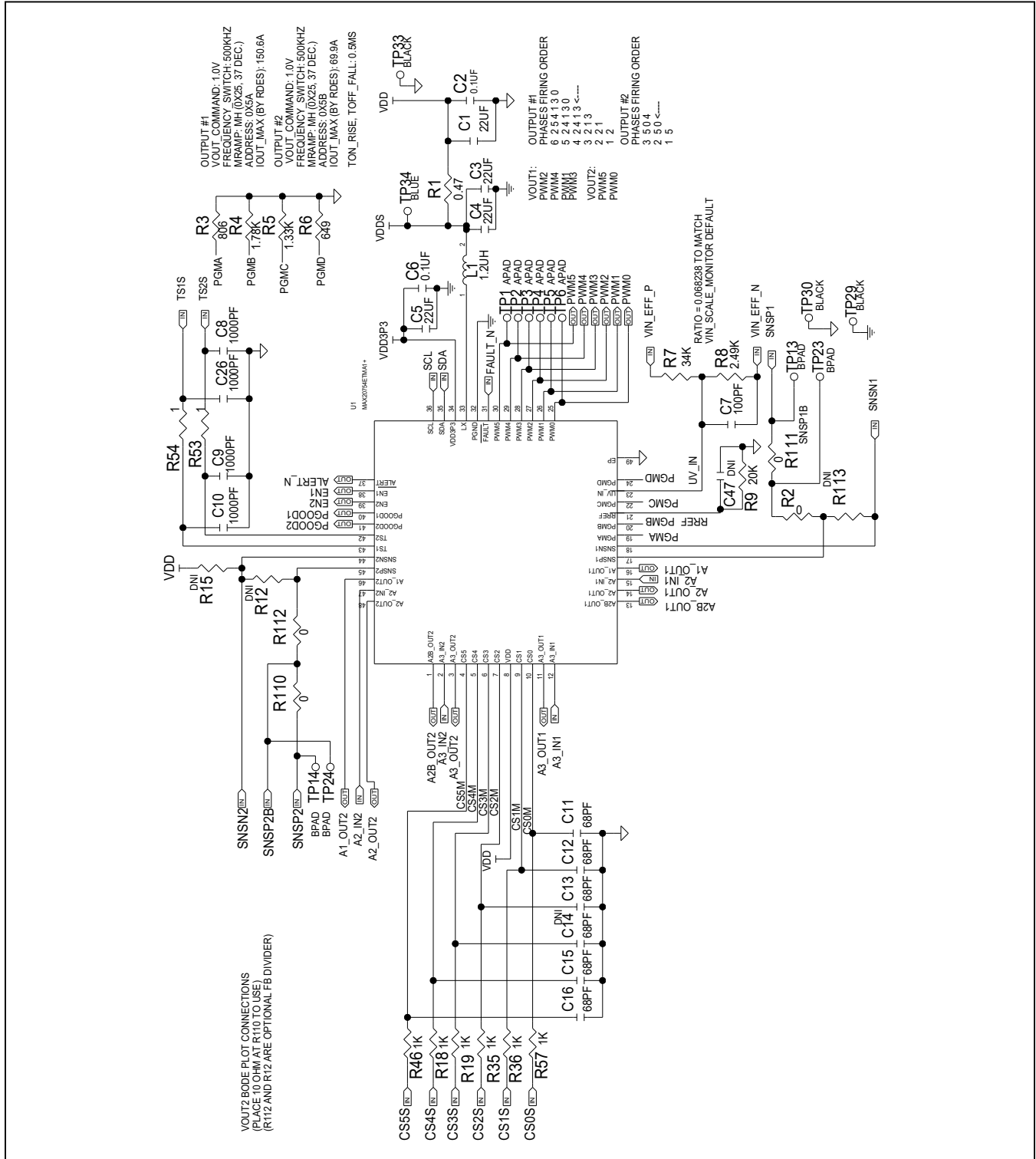
MAX20754 EV Kit Bill of Materials (continued)

ITEM REF_DES	DNI/ DNP	QTY	MFG PART #	MFG	VALUE	DESCRIPTION	COMMENTS
86 U11	-	1	NC7SZ08L6X	FAIRCHILD SEMICONDUCTOR	NC7SZ08L6	IC, AND, NC7SZ08: TINY LOGIC, ULTRA HIGH SPEED, TWO-INPUT AND GATE, MICROPACK	
87 U12	-	1	NC7SZ14M5X	FAIRCHILD SEMICONDUCTOR	NC7SZ14M	IC, INV, TINY LOGIC UHS INVERTER WITH SCHMITT TRIGGER INPUT, SOT23-5	
88 U13	-	1	NC7WZ3K8X	FAIRCHILD SEMICONDUCTOR	NC7WZ3K	IC, OR, TINY LOGIC, UHS DUAL 2-INPUT OR GATE, US8-8	
89 PCB	-	1	MAX20754HGR42	MAXIM	PCB	PCB:MAX20754HGR42	
90 MECH1-MECH4	DNI	4	1903C	KEYSTONE	N/A	STANDOFF, FEMALE-THREADED, HEX, 6-32, LENGTH=1/2IN, HEXWIDTH=1/4IN, NYLON	
91 MECH1-MECH4	DNI	4	NY PMS 632 0025 PH	B&F FASTENER SUPPLY	N/A	MACHINE SCREW, PHILIPS, PAN, 6-32, 1/4IN, NYLON	
92 C14	DNP	0	C0402C680J5GAC, GRM1555C1H680JA01	KEMET/MURATA	68PF	CAPACITOR, SMT, 0402, CERAMIC, 68pF, 50V, 5%, COG, -55degC to +125degC, 0 +/-30PPM/degC	
93 C34, C47, C52	DNP	0	GRM155R61C104K498	MURATA	0.1UF	CAPACITOR, SMT (0402), CERAMIC, 0.1UF, 16V, TOL=10%, MODEL=GRM SERIES, TG=-55 DEGC to +85 DEGC, TC=X5R	
94 C48	DNP	0	C0402C101J5GAC, NMIC0402NPO101JCC04 02JRNFO9BN101, GRM1555C1H101JA01, C1 005C0G1H101J050BAC, GA2B2C0G1H101L10 508A	KEMET/NIC COMPONENTS CORP./YAGEO PHICOMP/MURAT A/TDK/TKD	100PF	CAPACITOR, SMT (0402), CERAMIC CHIP, 100PF, 50V, TOL=-5%, TG=-55 DEGC TO +125 DEGC, TC=COG	
95 C131, C148	DNP	0	C3216X5R0J107M160A9, GRM155R60J107ME39	TDK/MURATA	100UF	CAPACITOR, SMT (2026), CERAMIC CHIP, 100UF, 6.3V, TOL=20%, TG=-55 DEGC TO +85 DEGC, TC=X5R	
96 R12, R15, R28, R33, R52, R55, R113	DNP	0	CRCW04020000Z0EDHP, RGS04020000Z0	VISHAY DRALORIC/VISHAY DALE	0	RESISTOR, 0402, 0 OHM, 0%, JUMPER, 0.2W, THICK FILM	
97 R29, R42	DNP	0	CRCW04021K40FK, RCO402ER-071K4L	VISHAY DALE/YAGEO PHICOMP	1.4K	RESISTOR, 0402, 1.4K OHM, 1%, 100PPM, 1/8W, THICK FILM	

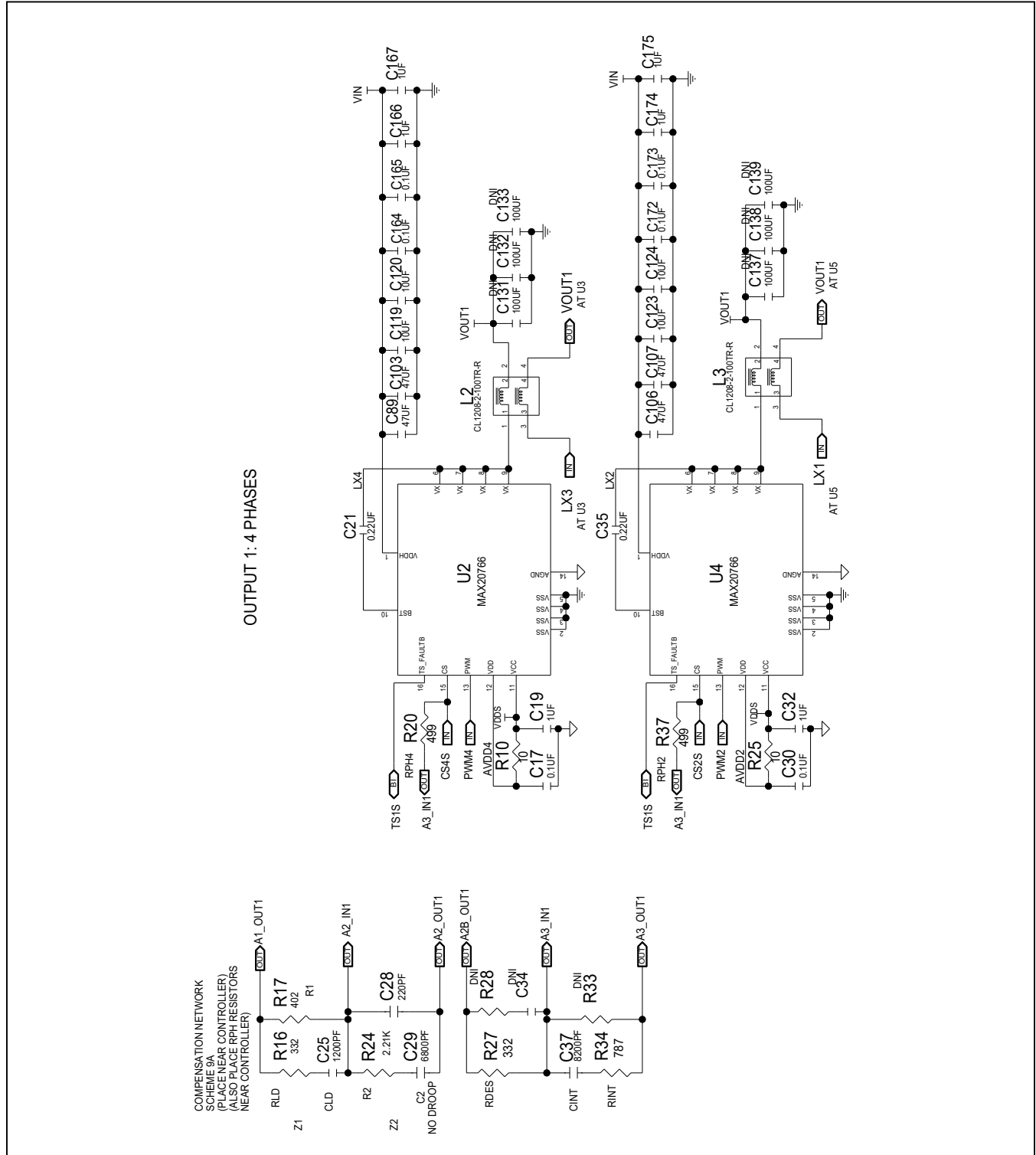
375

TOTAL

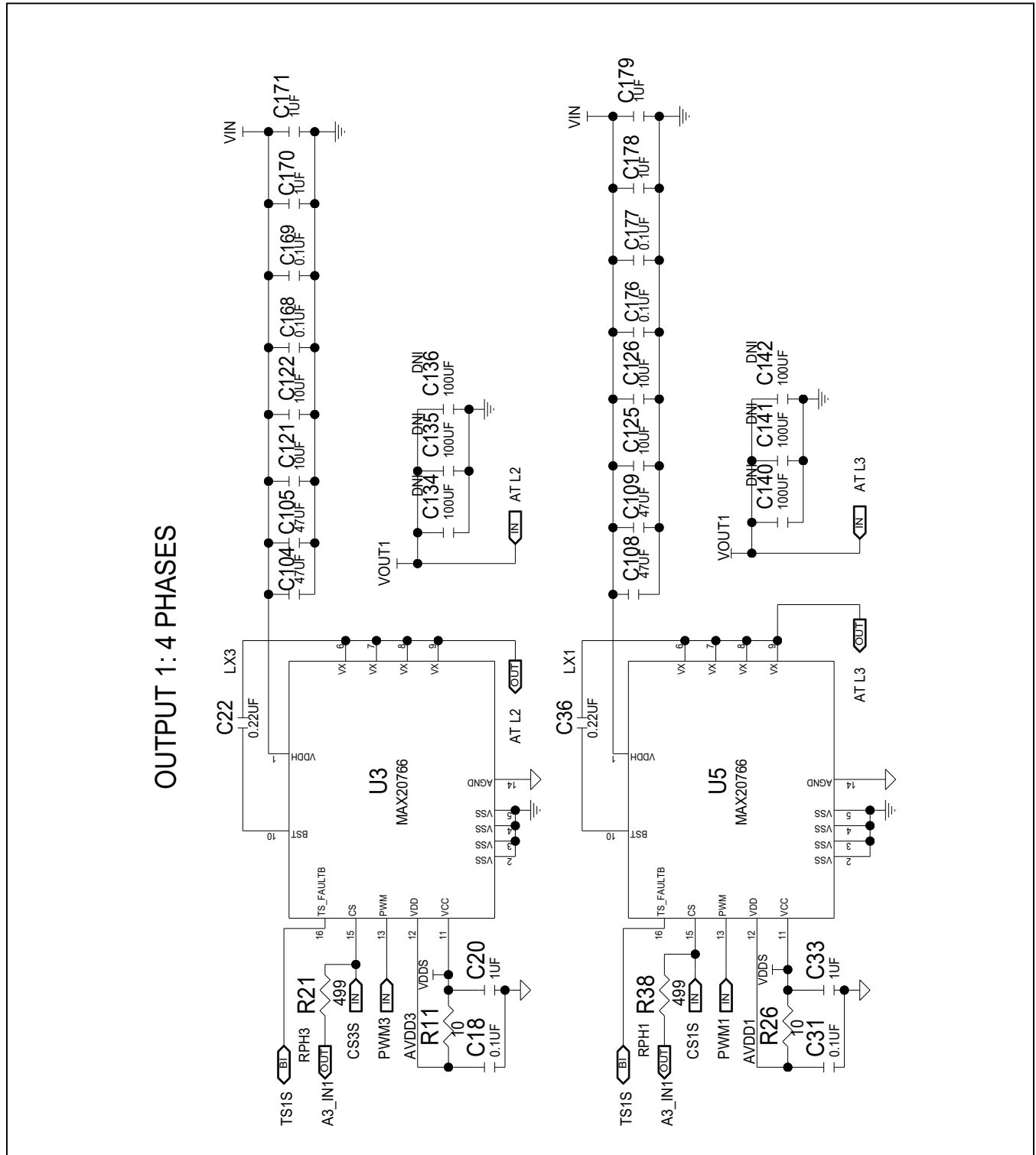
MAX20754 EV Kit Schematic



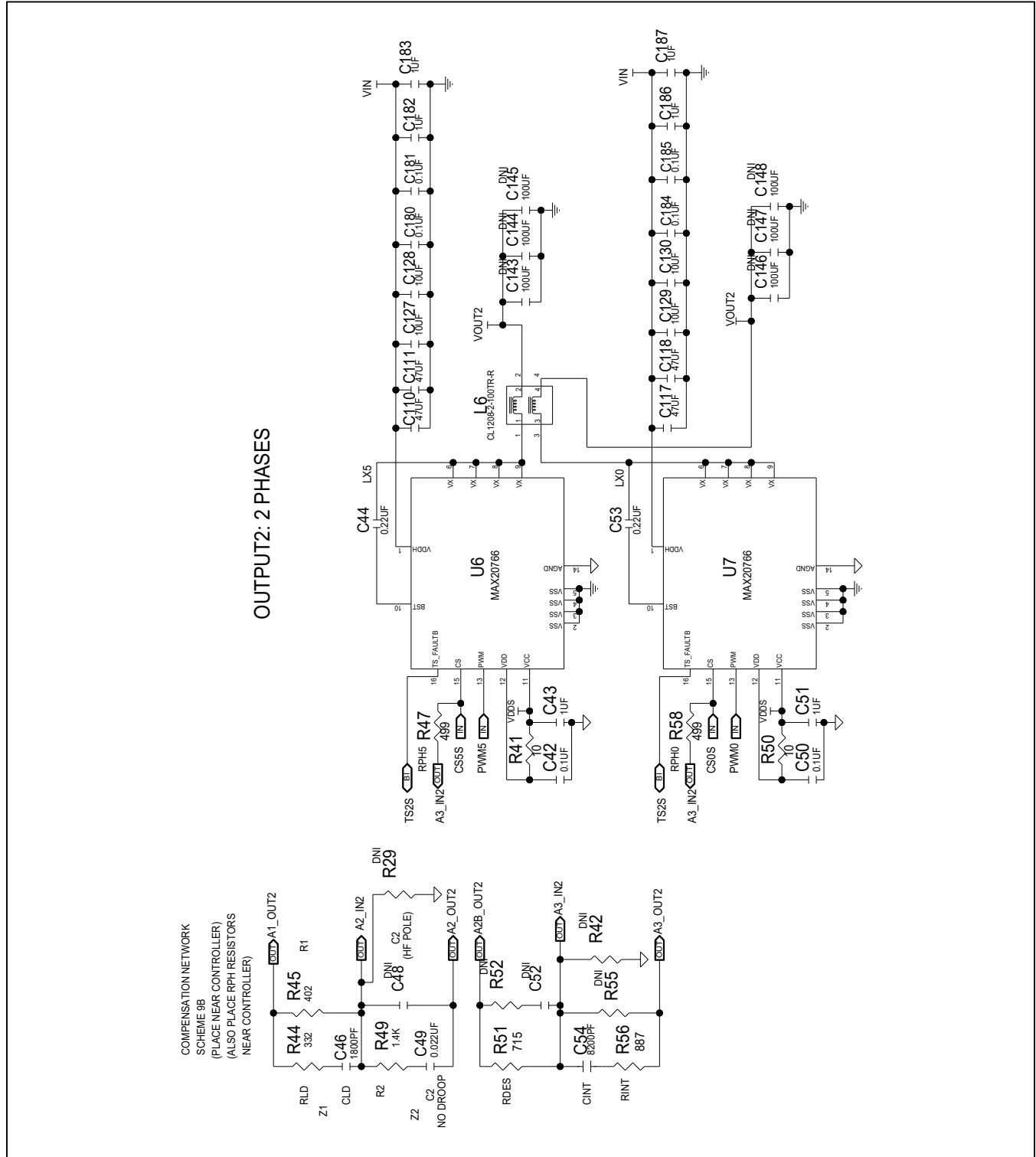
MAX20754 EV Kit Schematic (continued)



MAX20754 EV Kit Schematic (continued)



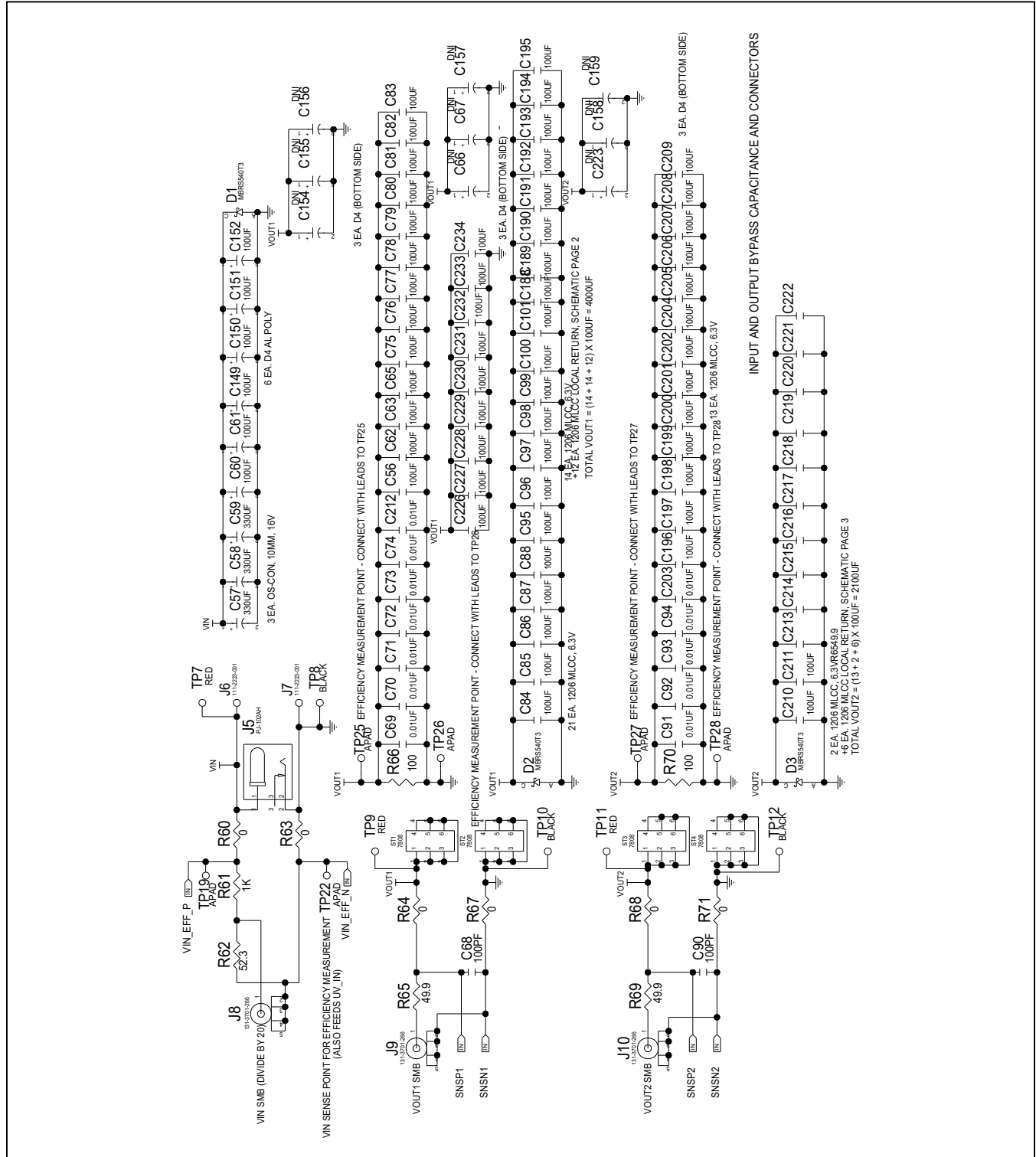
MAX20754 EV Kit Schematic (continued)



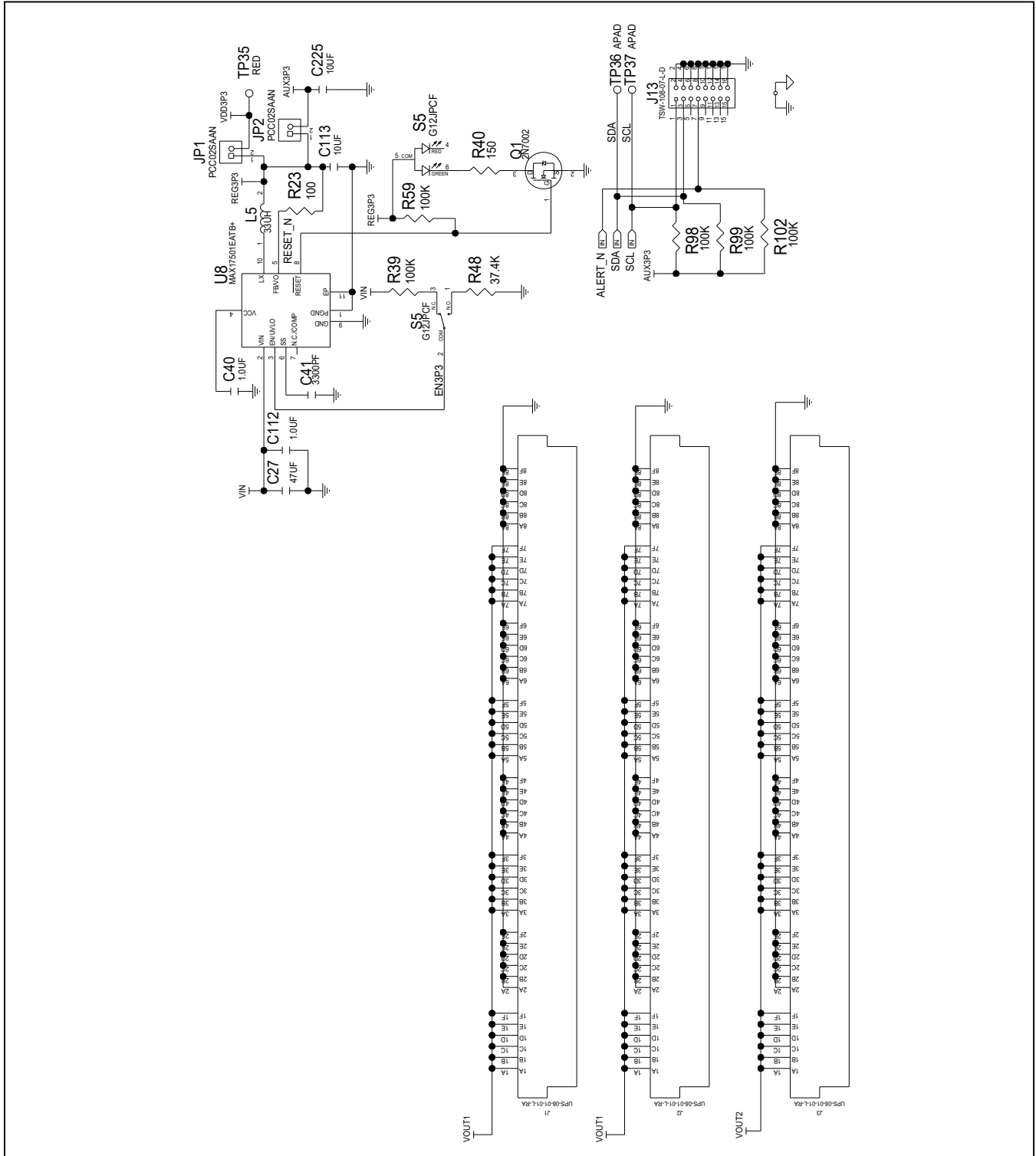
OUTPUT2: 2 PHASES

COMPENSATION NETWORK
SCHEME 9B
(PLACE NEAR CONTROLLER)
(ALSO PLACE RPH RESISTORS
NEAR CONTROLLER)

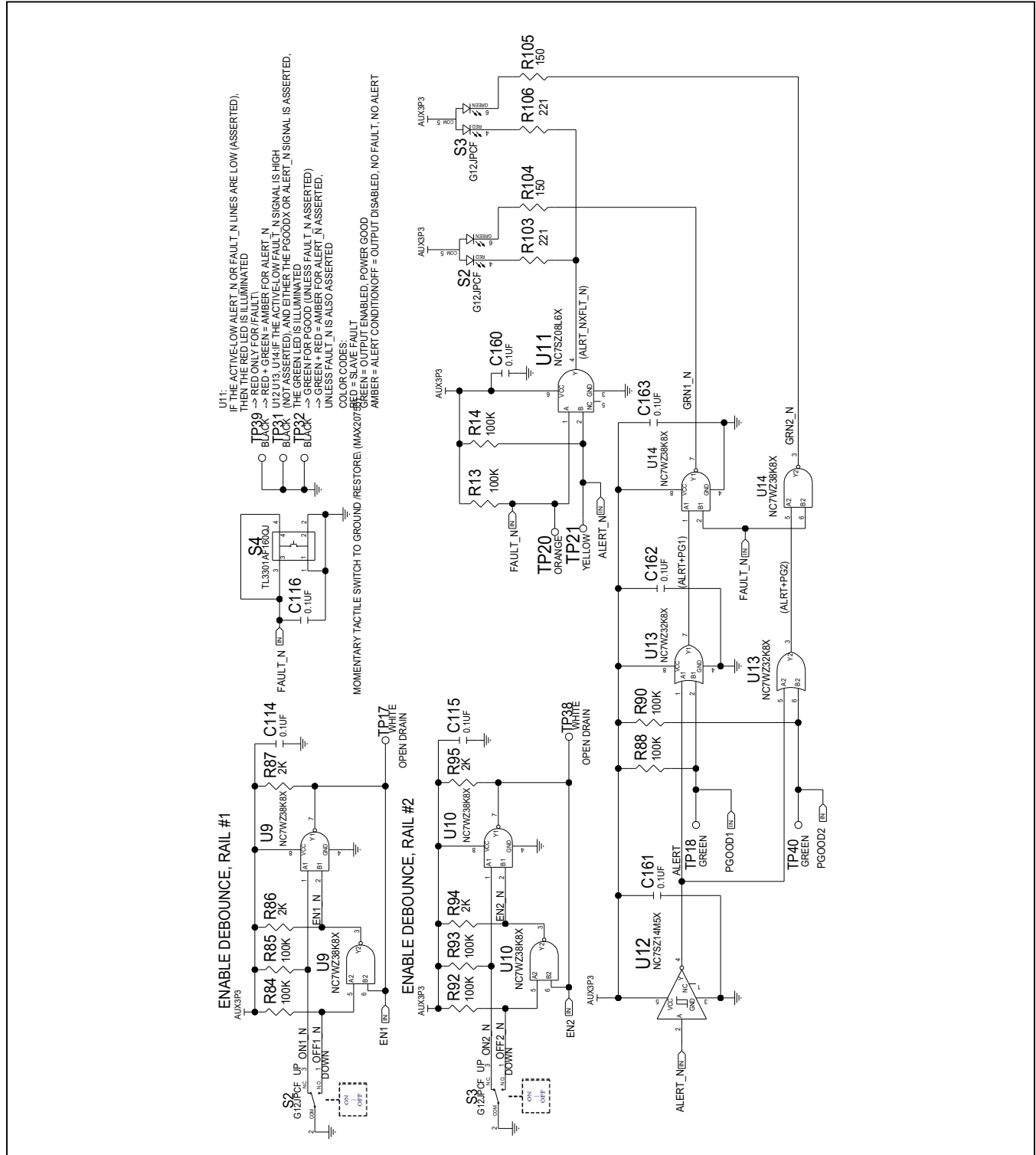
MAX20754 EV Kit Schematic (continued)



MAX20754 EV Kit Schematic (continued)



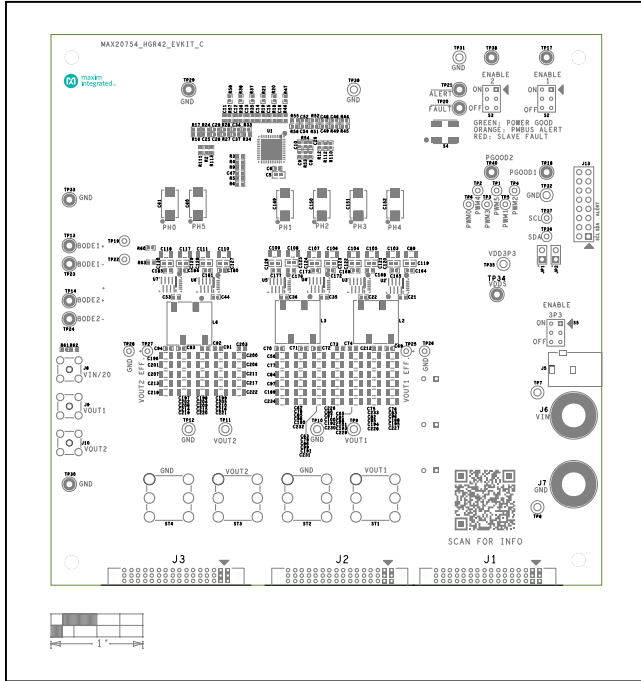
MAX20754 EV Kit Schematic (continued)



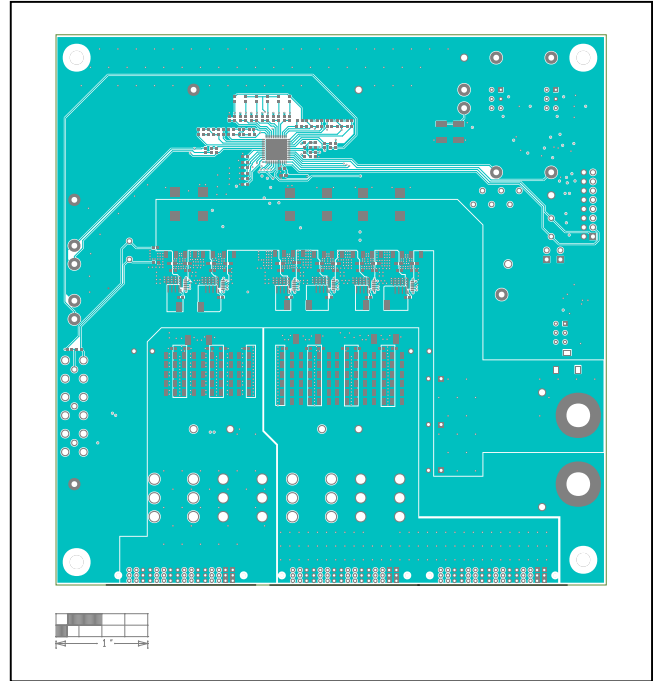
MAX20754 Evaluation Kit

Evaluates: MAX20754 and MAX20766

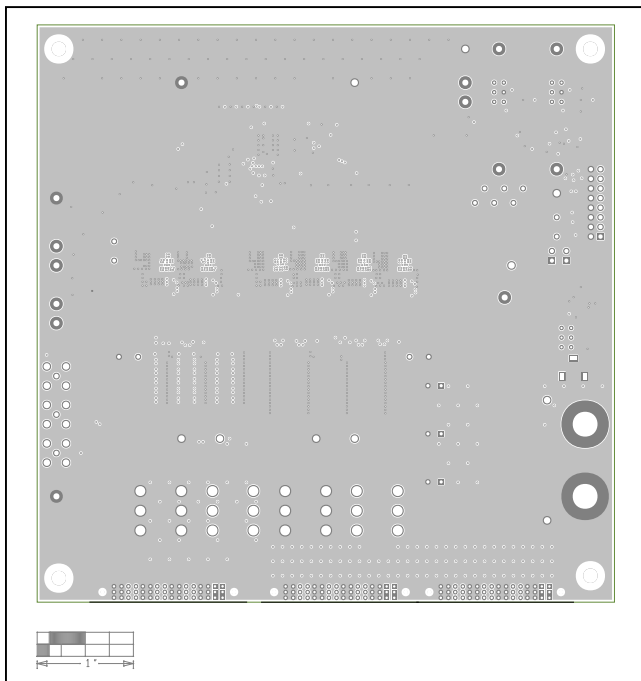
MAX20754 EV Kit PCB Layout Diagrams



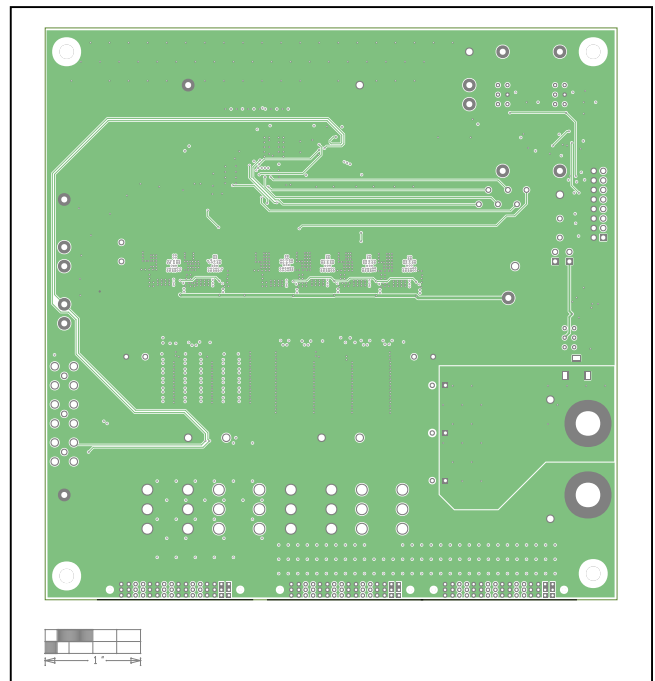
MAX20754 EV Kit—Top Silkscreen



MAX20754 EV Kit—Top

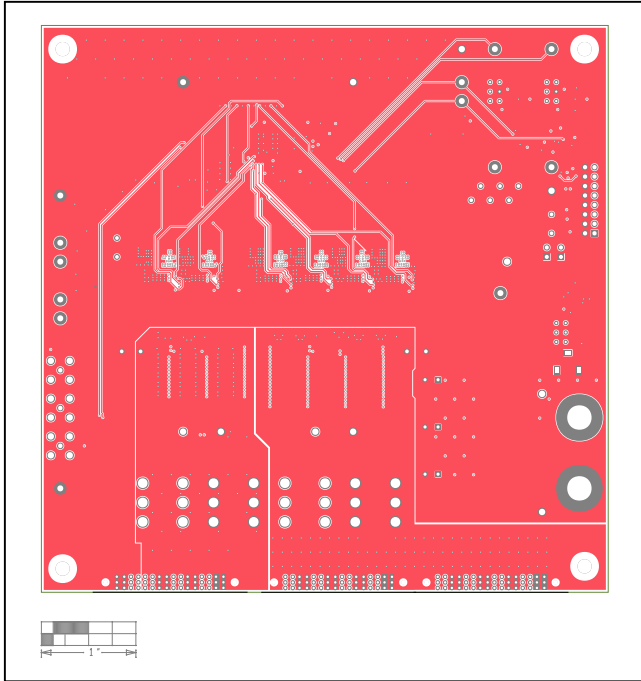


MAX20754 EV Kit—Level 2 GND

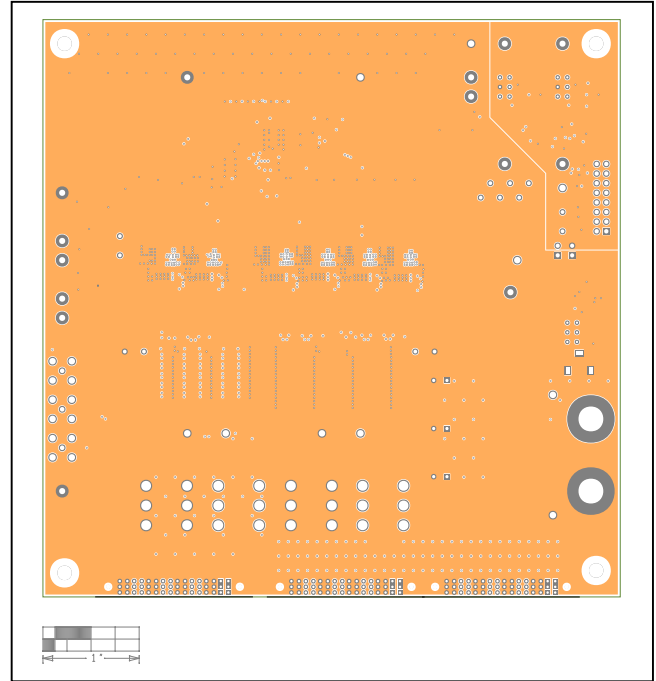


MAX20754 EV Kit—Level 3 Signal

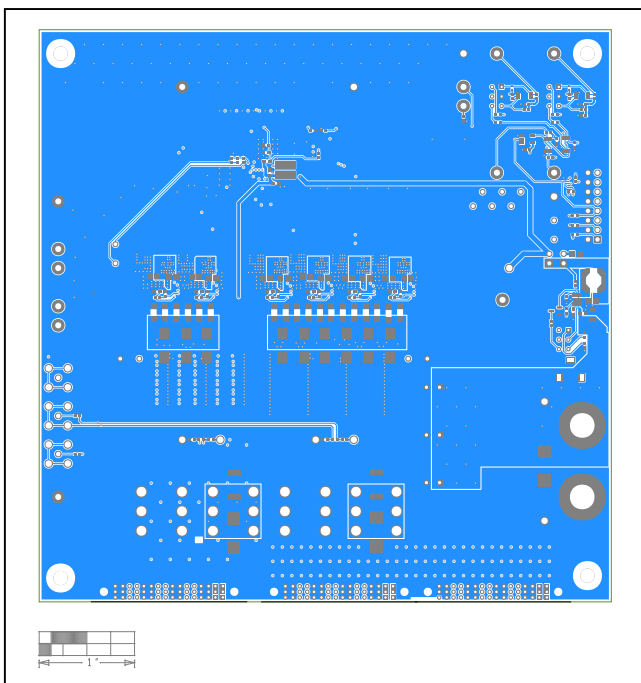
MAX20754 EV Kit PCB Layout Diagrams (continued)



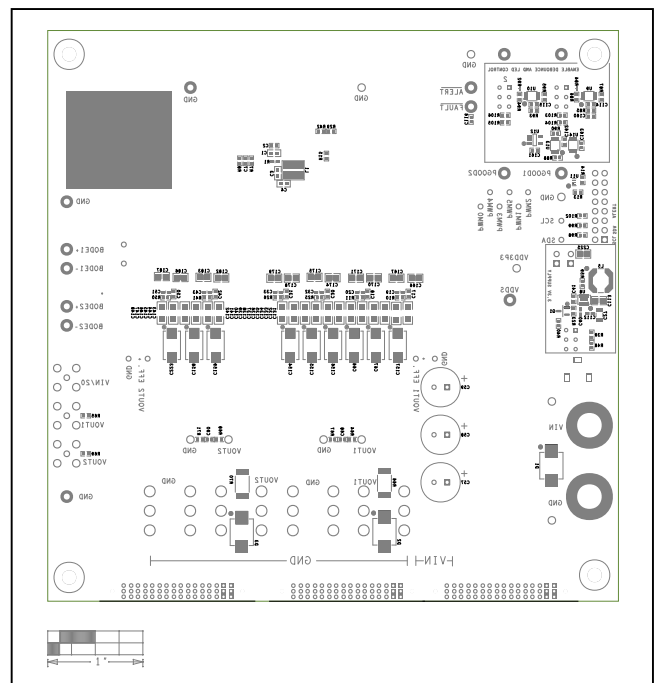
MAX20754 EV Kit—Level 4 Signal



MAX20754 EV Kit—Level 5 GND



MAX20754 EV Kit—Bottom



MAX20754 EV Kit—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	2/19	Initial release	—

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at <https://www.maximintegrated.com/en/storefront/storefront.html>.

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