

The photographs below show the PMP10804 Rev A assembly. This circuit was built on a PMP10804 Rev A PCB.

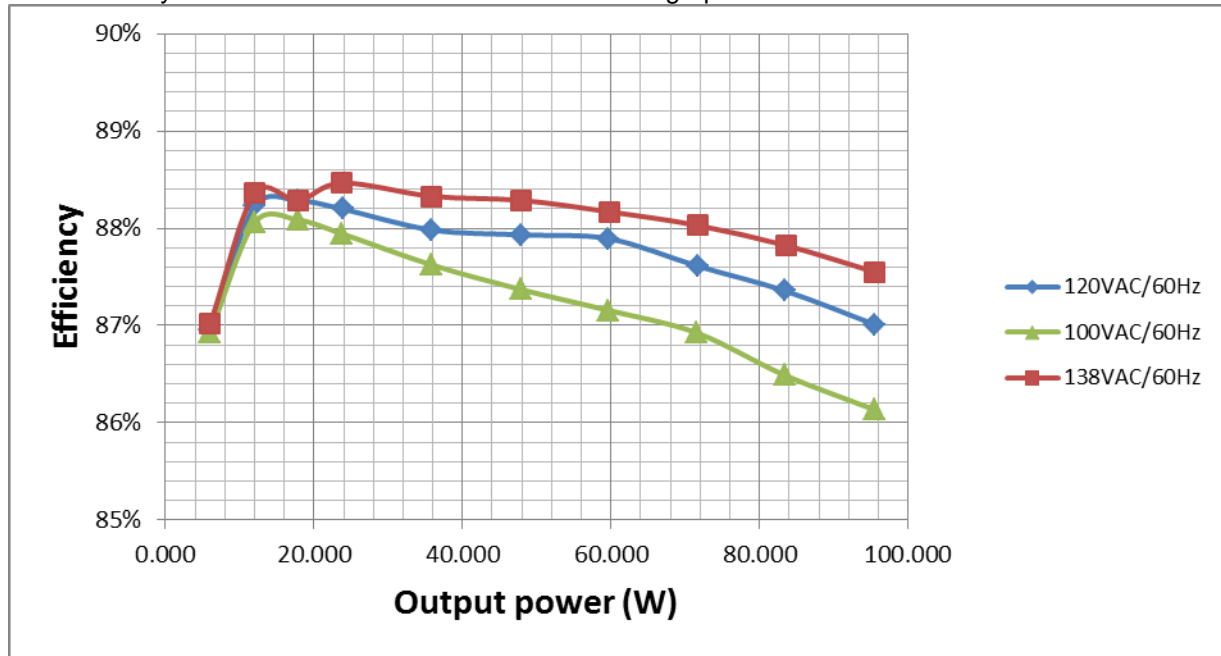
The image shows a custom-built electronic circuit board, likely a power supply or amplifier, featuring various components. A ruler is placed below the board for scale.

Key components visible include:

- Capacitors:** Several electrolytic capacitors (e.g., C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100, C101, C102, C103, C104, C105, C106, C107, C108, C109, C110, C111, C112, C113, C114, C115, C116, C117, C118, C119, C120, C121, C122, C123, C124, C125, C126, C127, C128, C129, C130, C131, C132, C133, C134, C135, C136, C137, C138, C139, C140, C141, C142, C143, C144, C145, C146, C147, C148, C149, C150, C151, C152, C153, C154, C155, C156, C157, C158, C159, C160, C161, C162, C163, C164, C165, C166, C167, C168, C169, C170, C171, C172, C173, C174, C175, C176, C177, C178, C179, C180, C181, C182, C183, C184, C185, C186, C187, C188, C189, C190, C191, C192, C193, C194, C195, C196, C197, C198, C199, C200, C201, C202, C203, C204, C205, C206, C207, C208, C209, C210, C211, C212, C213, C214, C215, C216, C217, C218, C219, C220, C221, C222, C223, C224, C225, C226, C227, C228, C229, C230, C231, C232, C233, C234, C235, C236, C237, C238, C239, C240, C241, C242, C243, C244, C245, C246, C247, C248, C249, C250, C251, C252, C253, C254, C255, C256, C257, C258, C259, C260, C261, C262, C263, C264, C265, C266, C267, C268, C269, C270, C271, C272, C273, C274, C275, C276, C277, C278, C279, C280, C281, C282, C283, C284, C285, C286, C287, C288, C289, C290, C291, C292, C293, C294, C295, C296, C297, C298, C299, C300, C301, C302, C303, C304, C305, C306, C307, C308, C309, C310, C311, C312, C313, C314, C315, C316, C317, C318, C319, C320, C321, C322, C323, C324, C325, C326, C327, C328, C329, C330, C331, C332, C333, C334, C335, C336, C337, C338, C339, C340, C341, C342, C343, C344, C345, C346, C347, C348, C349, C350, C351, C352, C353, C354, C355, C356, C357, C358, C359, C360, C361, C362, C363, C364, C365, C366, C367, C368, C369, C370, C371, C372, C373, C374, C375, C376, C377, C378, C379, C380, C381, C382, C383, C384, C385, C386, C387, C388, C389, C390, C391, C392, C393, C394, C395, C396, C397, C398, C399, C400, C401, C402, C403, C404, C405, C406, C407, C408, C409, C410, C411, C412, C413, C414, C415, C416, C417, C418, C419, C420, C421, C422, C423, C424, C425, C426, C427, C428, C429, C430, C431, C432, C433, C434, C435, C436, C437, C438, C439, C440, C441, C442, C443, C444, C445, C446, C447, C448, C449, C450, C451, C452, C453, C454, C455, C456, C457, C458, C459, C460, C461, C462, C463, C464, C465, C466, C467, C468, C469, C470, C471, C472, C473, C474, C475, C476, C477, C478, C479, C480, C481, C482, C483, C484, C485, C486, C487, C488, C489, C490, C491, C492, C493, C494, C495, C496, C497, C498, C499, C500, C501, C502, C503, C504, C505, C506, C507, C508, C509, C510, C511, C512, C513, C514, C515, C516, C517, C518, C519, C520, C521, C522, C523, C524, C525, C526, C527, C528, C529, C530, C531, C532, C533, C534, C535, C536, C537, C538, C539, C540, C541, C542, C543, C544, C545, C546, C547, C548, C549, C550, C551, C552, C553, C554, C555, C556, C557, C558, C559, C560, C561, C562, C563, C564, C565, C566, C567, C568, C569, C570, C571, C572, C573, C574, C575, C576, C577, C578, C579, C580, C581, C582, C583, C584, C585, C586, C587, C588, C589, C590, C591, C592, C593, C594, C595, C596, C597, C598, C599, C600, C601, C602, C603, C604, C605, C606, C607, C608, C609, C610, C611, C612, C613, C614, C615, C616, C617, C618, C619, C620, C621, C622, C623, C624, C625, C626, C627, C628, C629, C630, C631, C632, C633, C634, C635, C636, C637, C638, C639, C640, C641, C642, C643, C644, C645, C646, C647, C648, C649, C650, C651, C652, C653, C654, C655, C656, C657, C658, C659, C660, C661, C662, C663, C664, C665, C666, C667, C668, C669, C670, C671, C672, C673, C674, C675, C676, C677, C678, C679, C680, C681, C682, C683, C684, C685, C686, C687, C688, C689, C690, C691, C692, C693, C694, C695, C696, C697, C698, C699, C700, C701, C702, C703, C704, C705, C706, C707, C708, C709, C710, C711, C712, C713, C714, C715, C716, C717, C718, C719, C720, C721, C722, C723, C724, C725, C726, C727, C728, C729, C730, C731, C732, C733, C734, C735, C736, C737, C738, C739, C740, C741, C742, C743, C744, C745, C746, C747, C748, C749, C750, C751, C752, C753, C754, C755, C756, C757, C758, C759, C760, C761, C762, C763, C764, C765, C766, C767, C768, C769, C770, C771, C772, C773, C774, C775, C776, C777, C778, C779, C780, C781, C782, C783, C784, C785, C786, C787, C788, C789, C790, C791, C792, C793, C794, C795, C796, C797, C798, C799, C800, C801, C802, C803, C804, C805, C806, C807, C808, C809, C810, C811, C812, C813, C814, C815, C816, C817, C818, C

2 Converter Efficiency

The efficiency data of PMP10804Rev A is shown in the graph and table below.



100V/60Hz

Vin(AC)	Iin(A)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Eff. (%)
99.99	1.65800	110.820	23.810	4.01	95.454	86.13%
100.29	1.45400	96.380	23.810	3.50	83.359	86.49%
100.01	1.25900	82.270	23.830	3.00	71.514	86.93%
100.09	1.06200	68.410	23.840	2.50	59.624	87.16%
100.03	0.86600	54.740	23.830	2.01	47.827	87.37%
100.29	0.66380	40.930	23.830	1.51	35.864	87.62%
100.56	0.45460	27.070	23.830	1.00	23.806	87.94%
100.19	0.35170	20.290	23.830	0.75	17.873	88.09%
100.06	0.24860	13.633	24.010	0.50	12.005	88.06%
100.25	0.13684	6.900	23.990	0.25	5.998	86.92%
100.49	0.01156	0.093	24.260	0.00	0.000	0.00%

120V/60Hz

Vin(AC)	Iin(A)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Eff. (%)
120.06	1.41600	109.750	23.820	4.01	95.494	87.01%
120.27	1.24800	95.560	23.830	3.50	83.476	87.36%
120.08	1.08500	81.880	23.840	3.01	71.735	87.61%
120.28	0.91500	67.920	23.850	2.50	59.697	87.89%
119.76	0.74970	54.490	23.850	2.01	47.915	87.93%
120.01	0.57700	40.780	23.840	1.51	35.879	87.98%
120.07	0.39880	27.030	23.840	1.00	23.840	88.20%
120.19	0.30760	20.190	23.830	0.75	17.825	88.29%
120.01	0.21740	13.601	24.000	0.50	12.000	88.23%
120.17	0.12095	6.926	24.090	0.25	6.023	86.95%
120.35	0.01362	0.095	24.380	0.00	0.000	0.00%

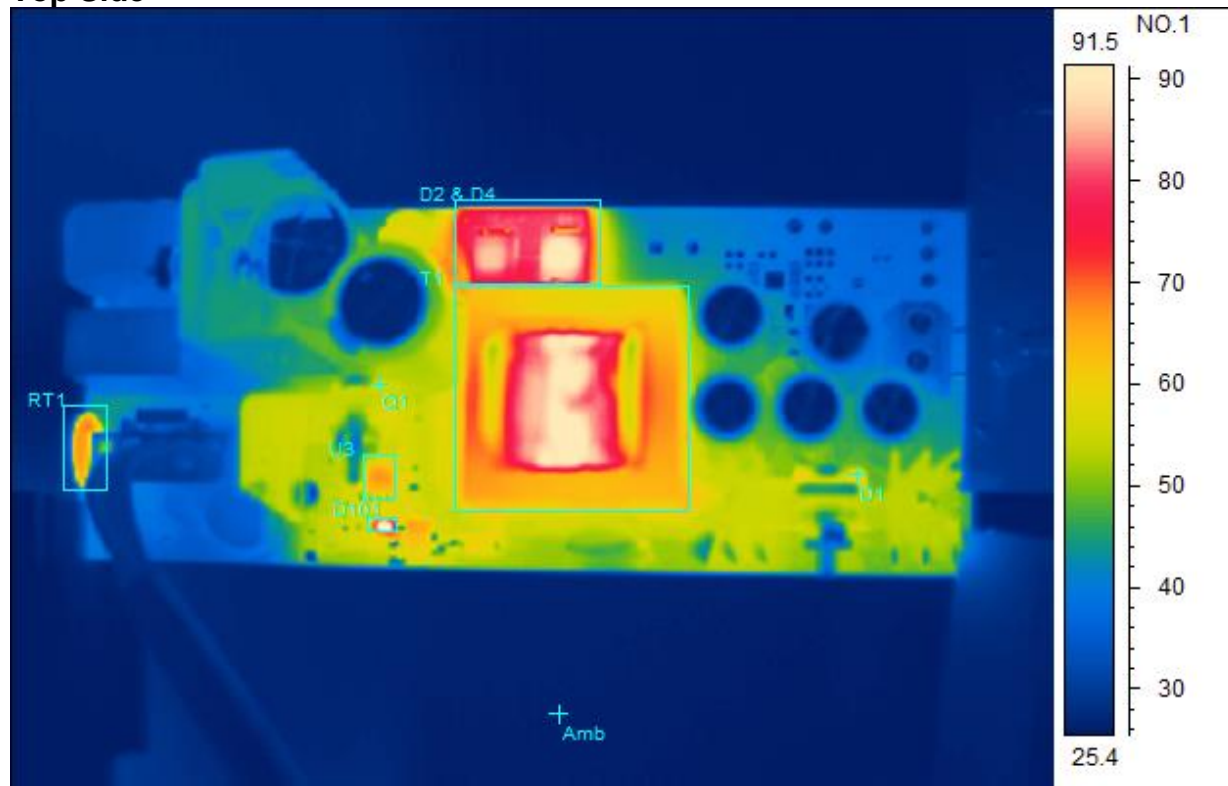
138V/60Hz

Vin(AC)	Iin(A)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Eff. (%)
137.95	1.25700	109.120	23.830	4.01	95.534	87.55%
138.16	1.11000	95.200	23.840	3.51	83.607	87.82%
138.04	0.96400	81.470	23.850	3.01	71.717	88.03%
138.25	0.81600	67.760	23.850	2.51	59.744	88.17%
138.40	0.66470	54.190	23.850	2.01	47.843	88.29%
138.18	0.51270	40.620	23.840	1.51	35.879	88.33%
137.97	0.35340	26.910	23.830	1.00	23.806	88.47%
138.09	0.27390	20.190	23.830	0.75	17.825	88.29%
138.26	0.19451	13.581	24.000	0.50	12.000	88.36%
138.42	0.10877	6.900	23.920	0.25	6.004	87.01%
138.07	0.01550	0.096	24.260	0.00	0.000	0.00%

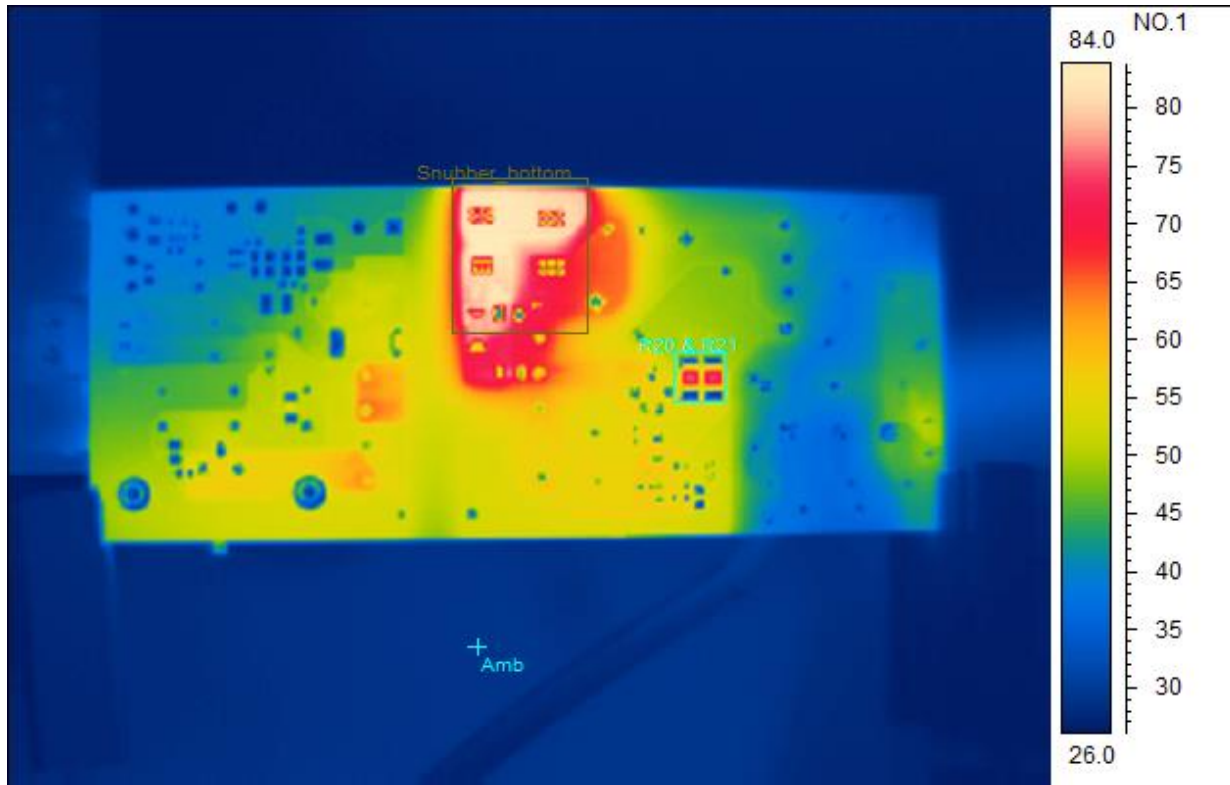
3 Thermal Images

The thermal images below show a top view and bottom view of the board at 120V_{AC}/60Hz input. The ambient temperature was 20°C with no forced air flow. The outputs were loaded with 24V/4A.

Top Side



Spot analysis	Value
D1Temperature	64.2°C
Q1Temperature	61.5°C
Amb Temperature	26.3°C
Area analysis	Value
D2 & D4Max	92.2°C
T1Max	93.8°C
D101Max	98.3°C
U3Max	70.7°C
RT1Max	71.8°C

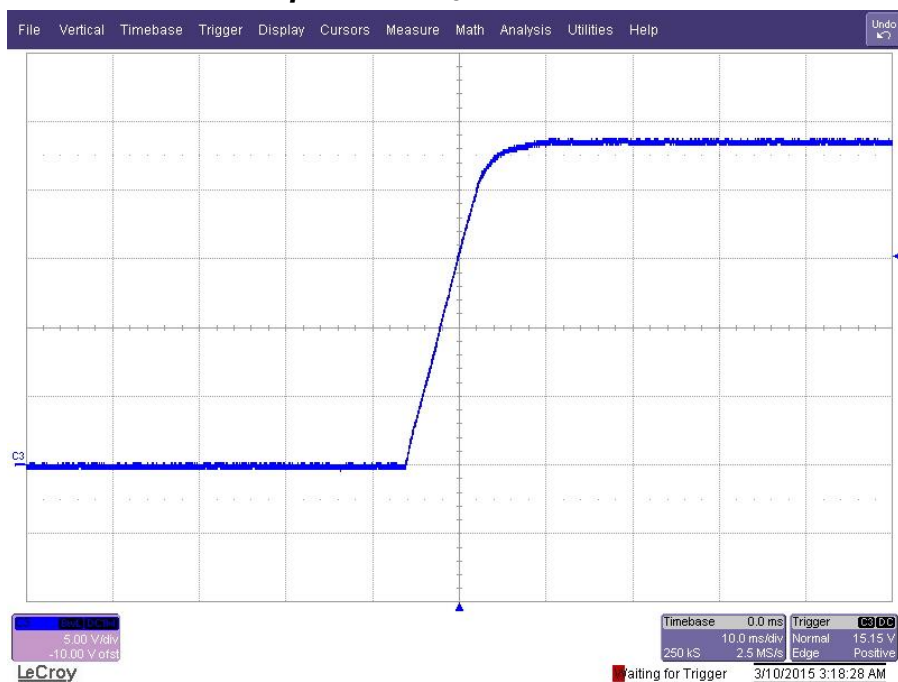
Bottom Side

Spot analysis	Value
AmbTemperature	29.8°C
Area analysis	Value
Snubber_bottomMax	85.2°C
R20 & R21 Max	76.2°C

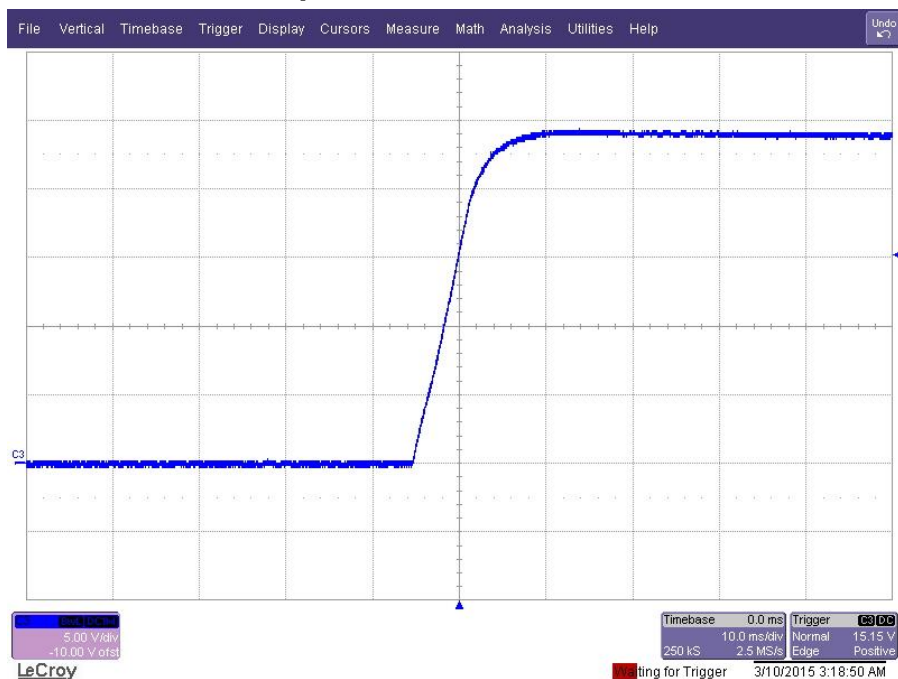
4 Startup

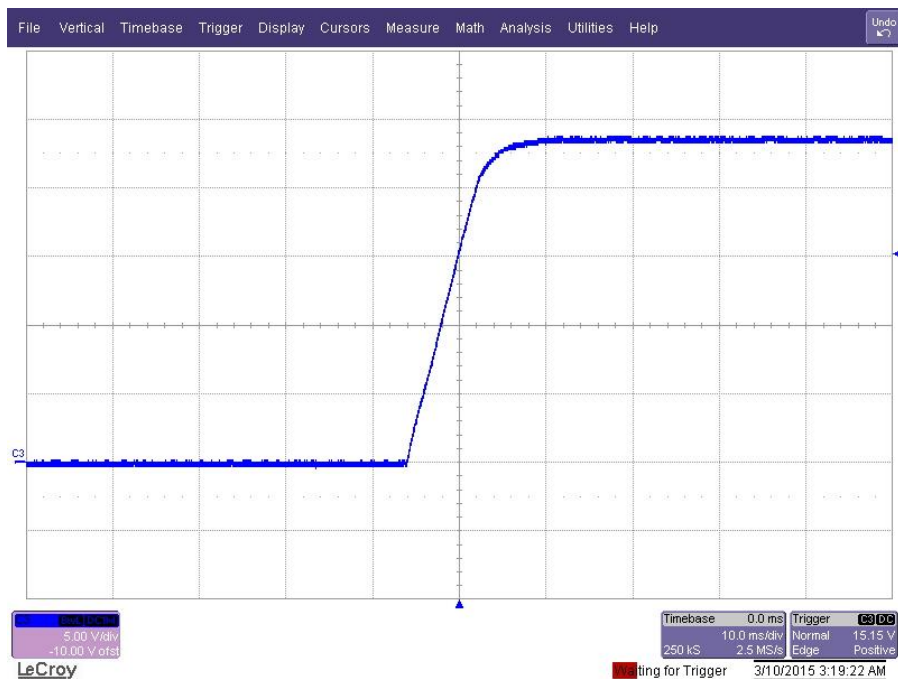
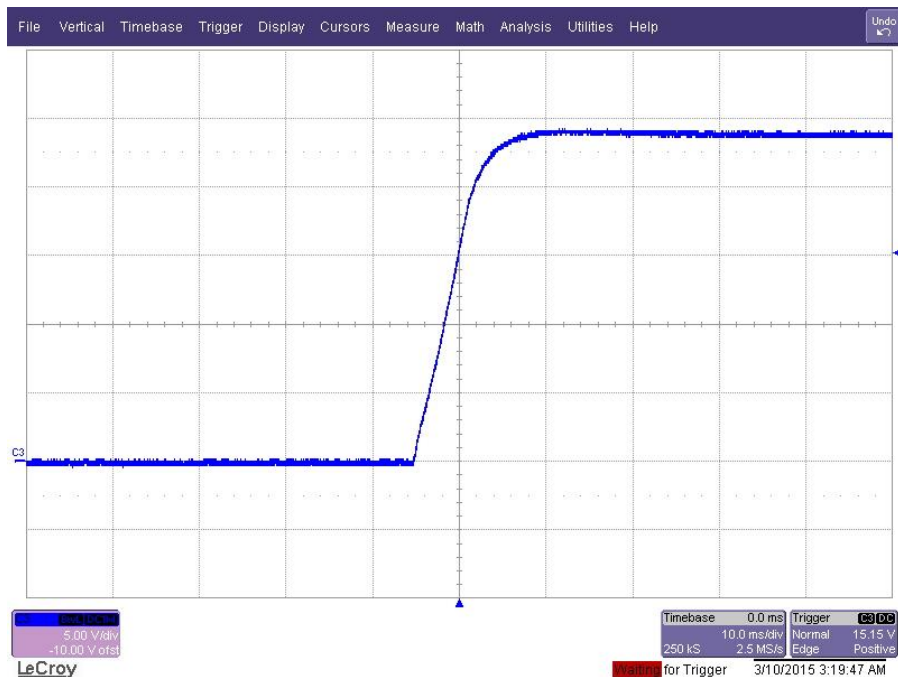
The output voltages at startup are shown in the images below.

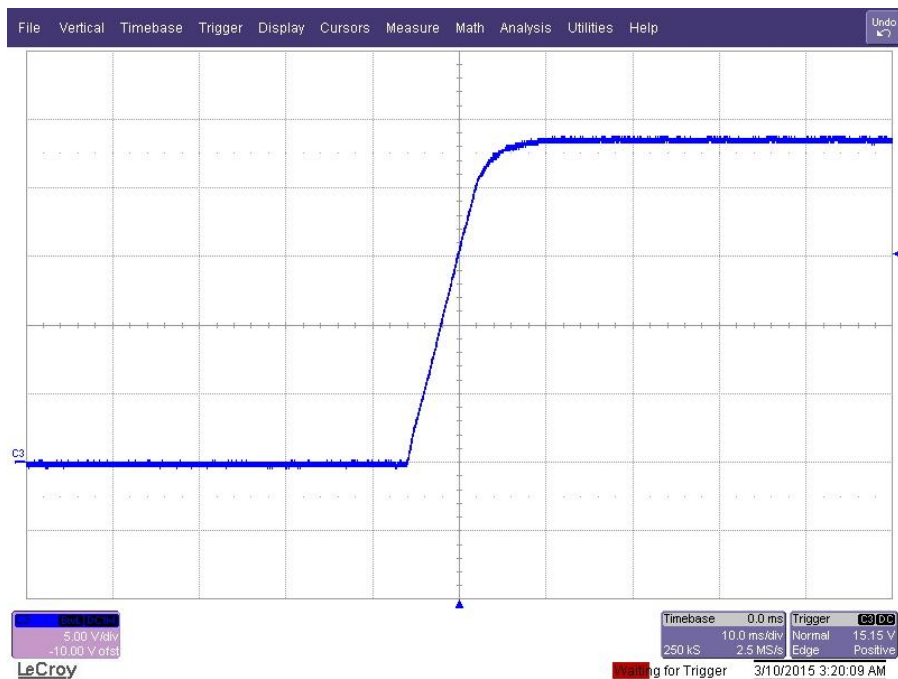
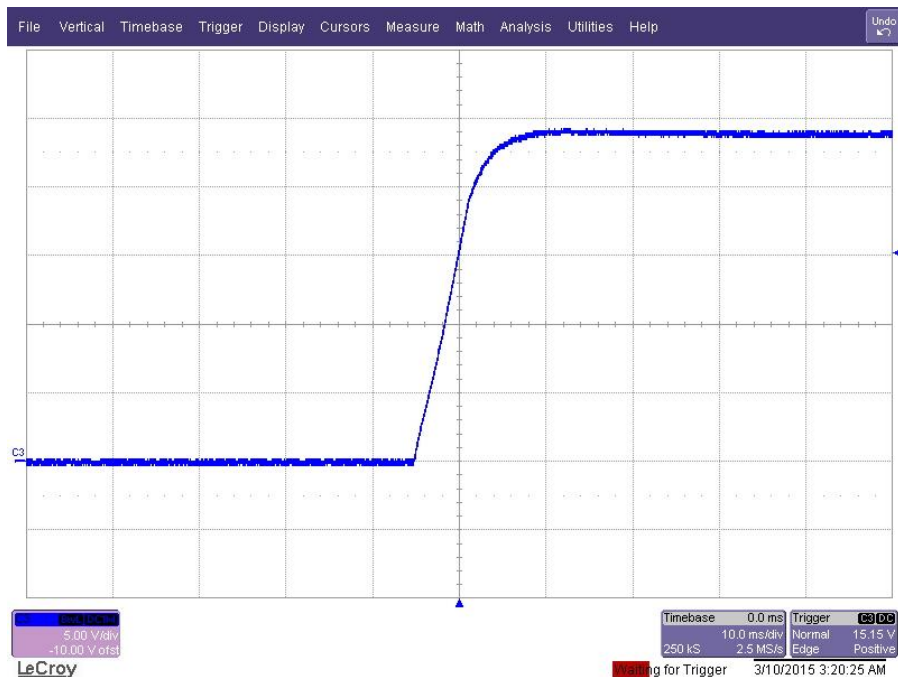
4.1 24V/4A startup @ 100V_{AC}/60Hz.



4.2 No load startup @ 100V_{AC}/60Hz.



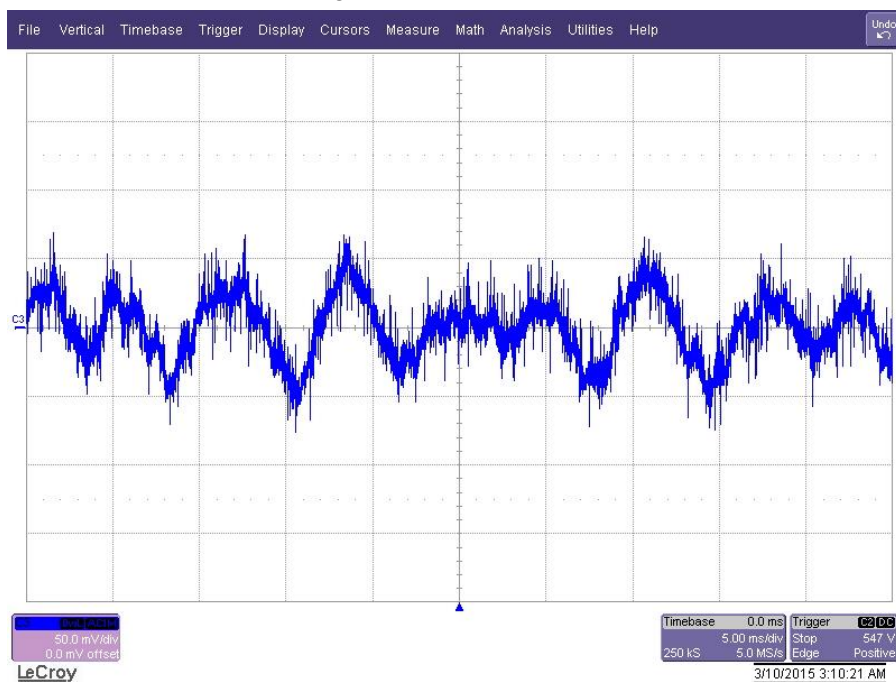
4.3 24V/4A startup @ 120V_{AC}/60Hz.**4.4 No load startup @ 120V_{AC}/60Hz.**

4.5 24V/4A startup @ 138V_{AC}/60Hz.**4.6 No load startup @ 138V_{AC}/60Hz.**

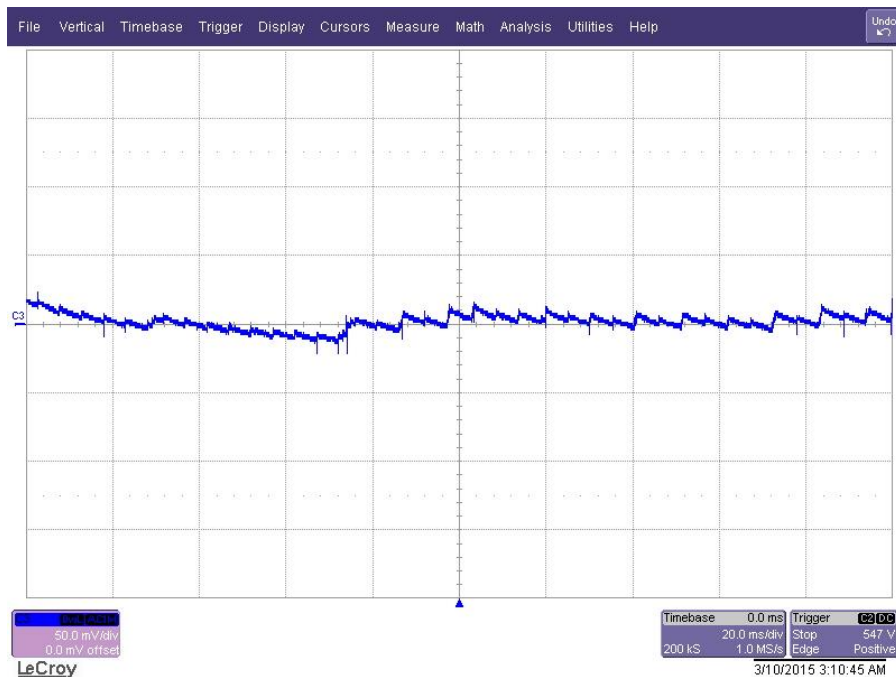
5 Output Ripple Voltages

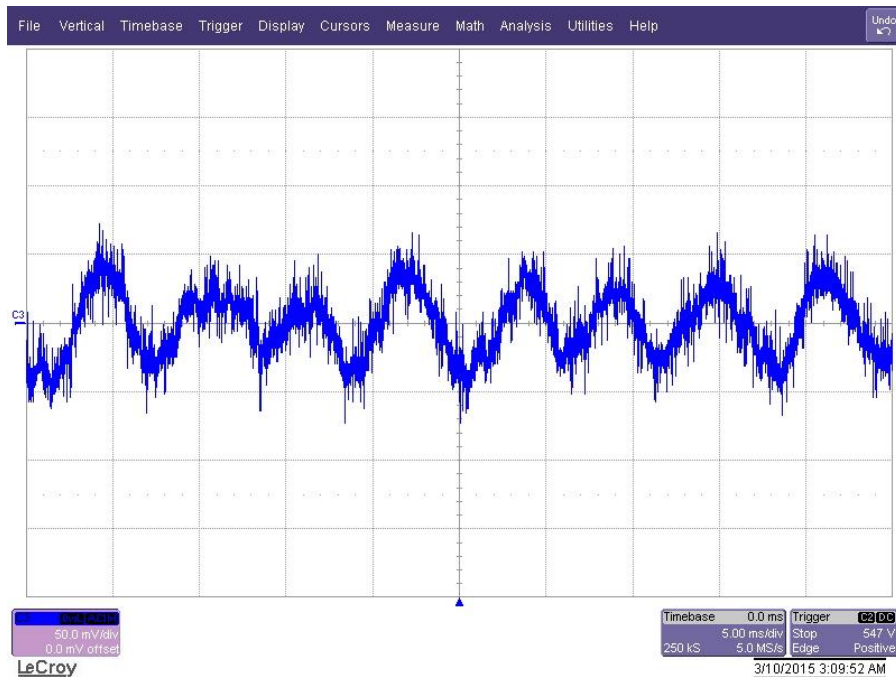
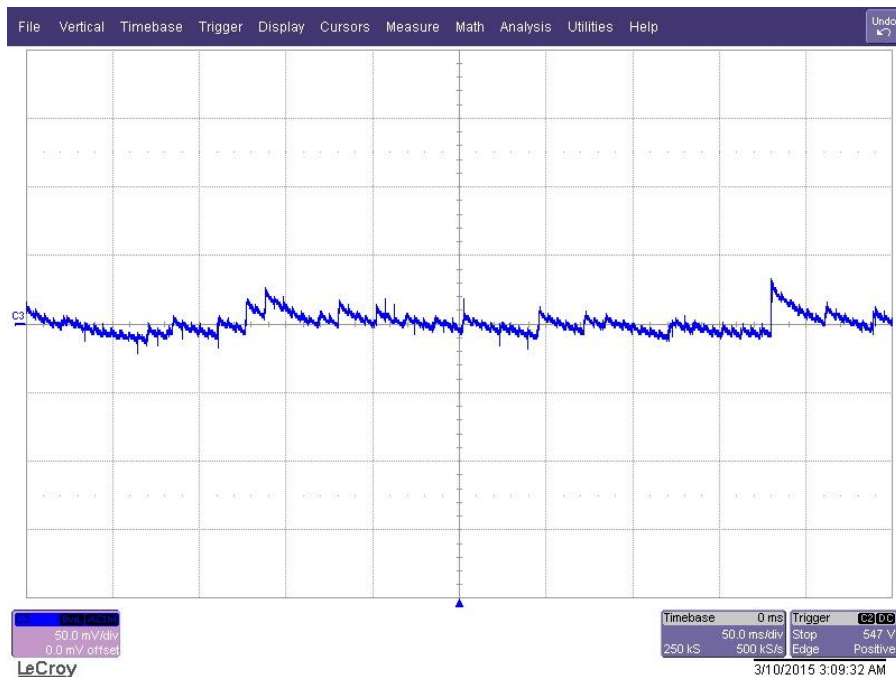
The output ripple voltages are shown in the plots below.

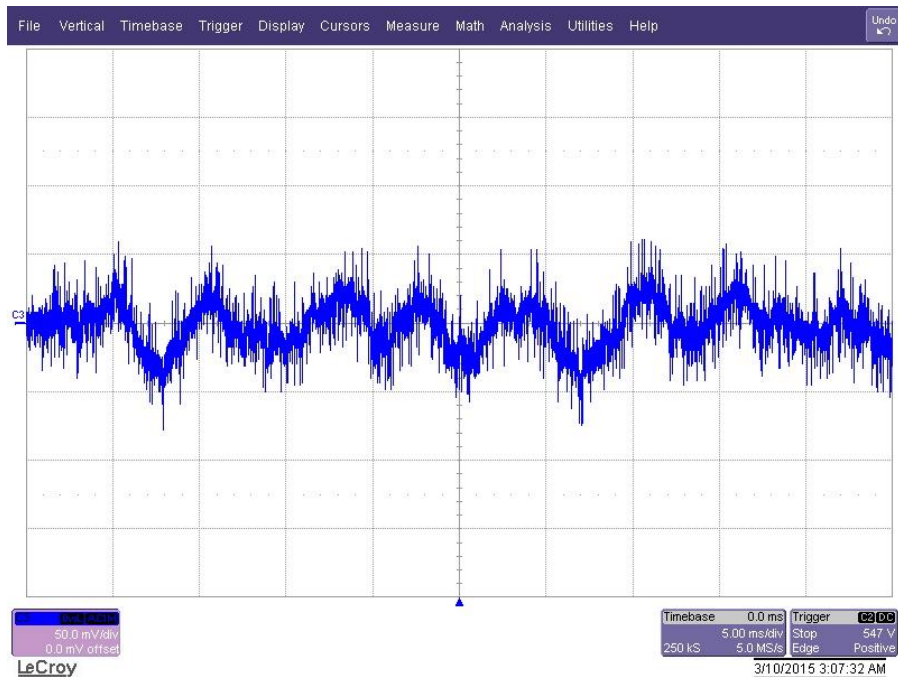
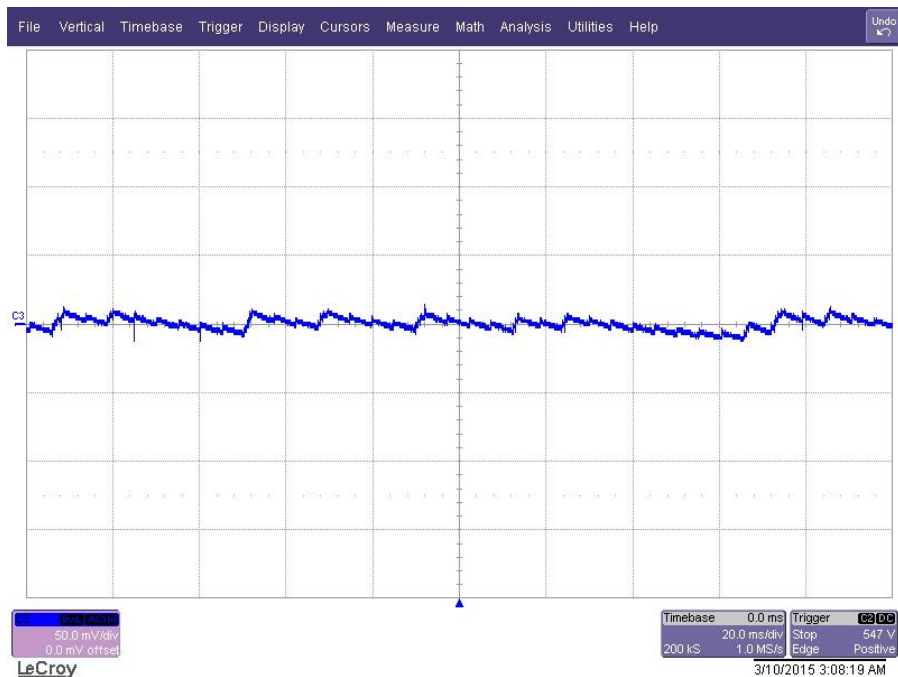
5.1 24V/4A @ 100V_{AC}/60Hz.



5.2 No load @ 100V_{AC}/60Hz.

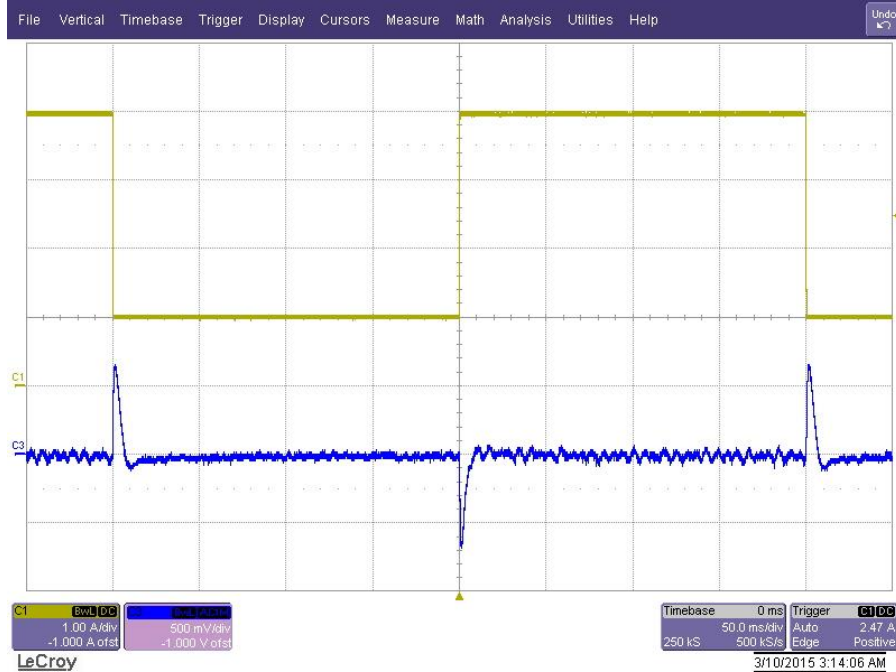


5.3 24V/4A @ 120V_{AC}/60Hz.**5.4 No load @ 120V_{AC}/60Hz.**

5.5 24V/4A @ 138V_{AC}/60Hz.**5.6 No load @ 138V_{AC}/60Hz.**

6 Dynamic Load Response

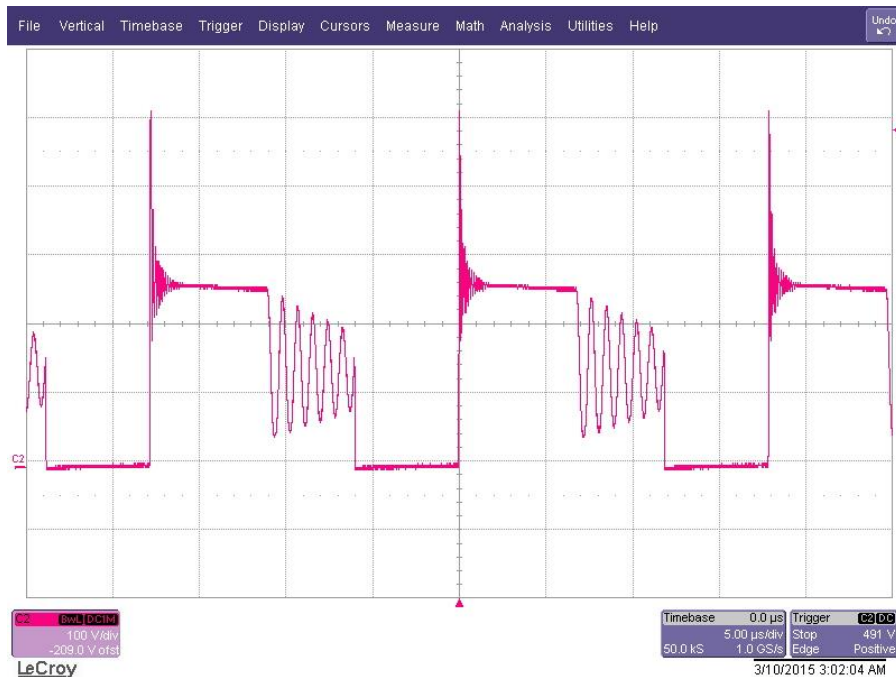
The image below shows the dynamic load response on 24V at 120V_{AC}/60Hz. Load step is from 1A to 4A.



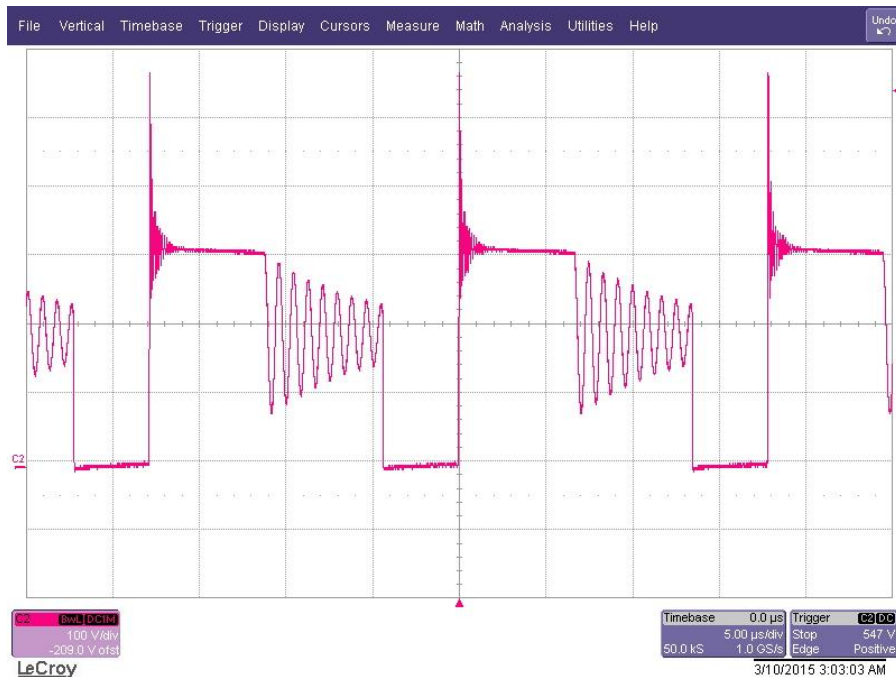
7 Switching Waveforms

The images below show key switching waveforms of PMP10804RevA. The waveforms are measured at full load.

7.1 Voltage at Q1 Drain @ 100V_{AC}/60Hz input and 24V/4A output.



7.2 Voltage at Q1 Drain @ 138V_{AC}/60Hz input and 24V/4A output.



IMPORTANT NOTICE FOR TI REFERENCE DESIGNS

Texas Instruments Incorporated ("TI") reference designs are solely intended to assist designers ("Buyers") who are developing systems that incorporate TI semiconductor products (also referred to herein as "components"). Buyer understands and agrees that Buyer remains responsible for using its independent analysis, evaluation and judgment in designing Buyer's systems and products.

TI reference designs have been created using standard laboratory conditions and engineering practices. **TI has not conducted any testing other than that specifically described in the published documentation for a particular reference design.** TI may make corrections, enhancements, improvements and other changes to its reference designs.

Buyers are authorized to use TI reference designs with the TI component(s) identified in each particular reference design and to modify the reference design in the development of their end products. HOWEVER, NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY THIRD PARTY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT, IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI REFERENCE DESIGNS ARE PROVIDED "AS IS". TI MAKES NO WARRANTIES OR REPRESENTATIONS WITH REGARD TO THE REFERENCE DESIGNS OR USE OF THE REFERENCE DESIGNS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ACCURACY OR COMPLETENESS. TI DISCLAIMS ANY WARRANTY OF TITLE AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUIET ENJOYMENT, QUIET POSSESSION, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS WITH REGARD TO TI REFERENCE DESIGNS OR USE THEREOF. TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY BUYERS AGAINST ANY THIRD PARTY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON A COMBINATION OF COMPONENTS PROVIDED IN A TI REFERENCE DESIGN. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES, HOWEVER CAUSED, ON ANY THEORY OF LIABILITY AND WHETHER OR NOT TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, ARISING IN ANY WAY OUT OF TI REFERENCE DESIGNS OR BUYER'S USE OF TI REFERENCE DESIGNS.

TI reserves the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques for TI components are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

Reproduction of significant portions of TI information in TI data books, data sheets or reference designs is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards that anticipate dangerous failures, monitor failures and their consequences, lessen the likelihood of dangerous failures and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in Buyer's safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed an agreement specifically governing such use.

Only those TI components that TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components that have **not** been so designated is solely at Buyer's risk, and Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.