

Champs-Tech DC1929A PNs for Analog Ref Designs & Demo Boards

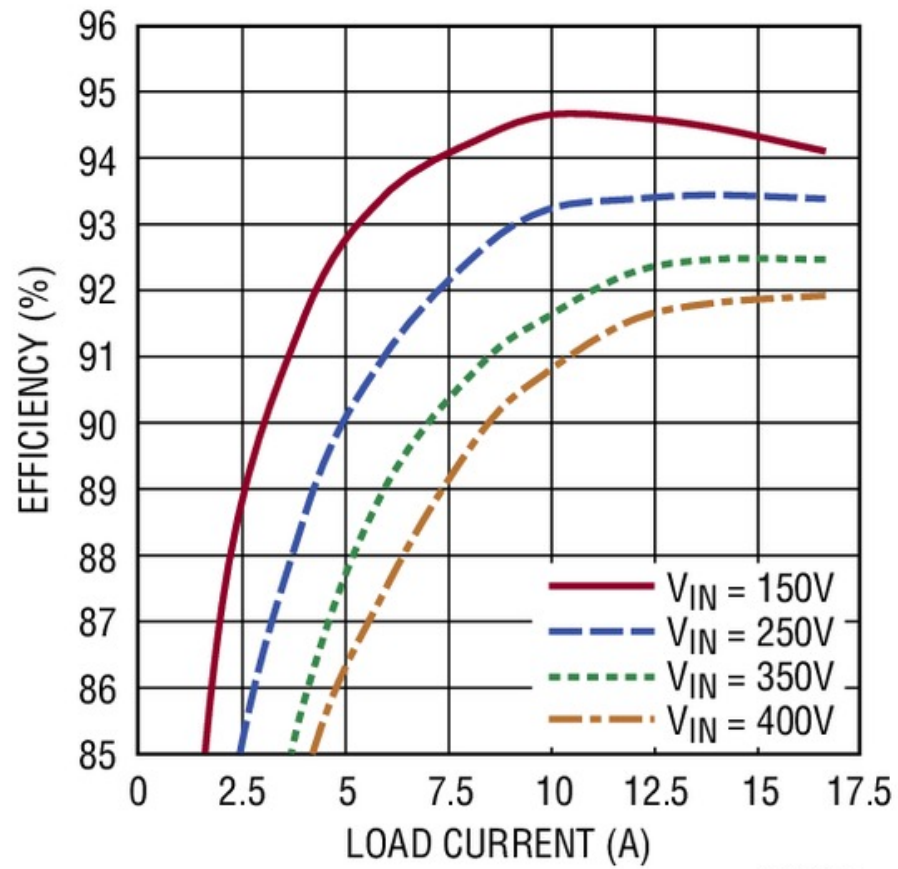


- Forward Active Clamp Topology -
- Highest Efficiency. Planar Design.
- Aggressive Interleave planar construction -- lowest achievable Leakage Inductance.
- Multilayer PCB optimization for lowest AC resistance and Proximity Effect.
- Wide variety of Turns Ratios in stock.
- Contact Us for DC-DC Module Design
- Contact Us for SM Assembly of all Components for DC-DC Converter

1. Ref Design DC1929A Based. "Off-Line" Input Voltage Range 150-420.

Champs PNs & DC1929A Catalog

Champs PN	Vin (Min)	Vin (Max)	Vout	Io
80R2-5AC-3125002-1M2	150	420	5	30.0
80R2-12AC-3124005-1M2	180	400	12	16.7
80R2-15AC-3115006-1M2	180	400	15	12.5
80R2-24AC-3124010CT-1M2	150	400	24	10.0
80R2-24AC-3206CT-1M2	300	400	24	10.0
80R2-28AC-3222008	180	400	28	10.0
80R2-30AC-3208-1M2	300	400	30	8.0
80R2-24AC-3124010CT-1M2	300	400	57	3.0
Linear Technology DC1929A URL				



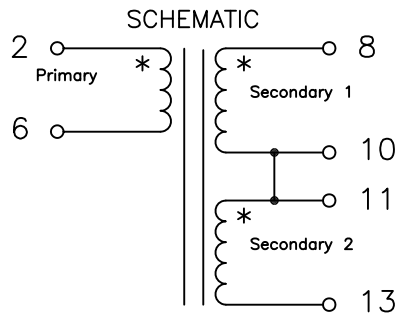
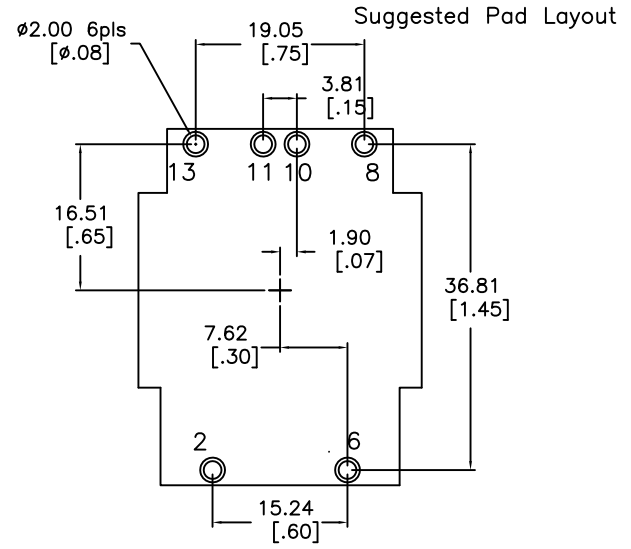
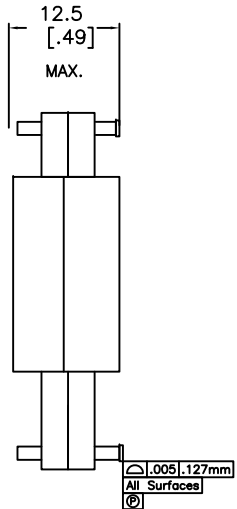
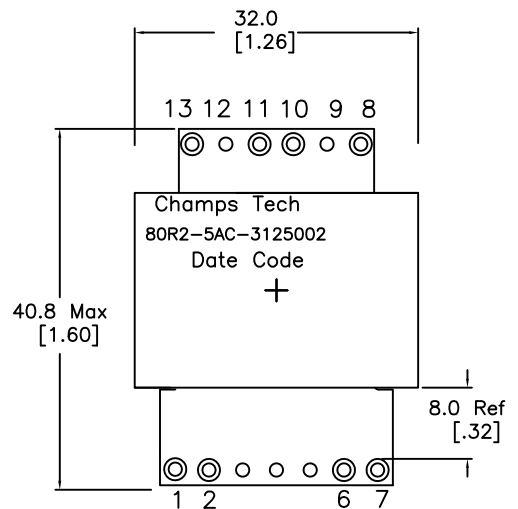
3752 TA06b

Options include discrete component or integrated complete DC-DC Converter Module:

- **Surface Mount Discrete Component Design.**
- **Discrete Component Implemented in Pad-to-Pad Mounting.**
- **Component implemented as Half-Embedded Design + SM Assembly of all components required of DC-DC Converter.**
- **Implemented as a Fully Embedded Design + SM Assembly of all components required of DC-DC Converter.**
- **SMT Component Assembly of PCB Including Planar Magnetics Inclusive of Converter Testing. Volume capacity 100K per month**

Notes:

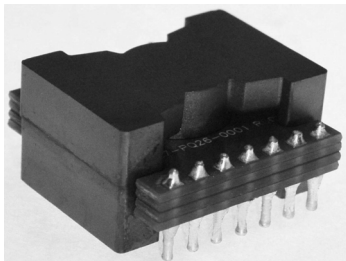
1. Consult Linear Tech Ref Design BOM and Schematic for exact device as specified for use by Linear in that Reference Design.
2. In all cases Champs Technologies makes no representation as to suitability of the Reference Design itself as that is the design responsibility and Intellectual Property of Linear Technology.
3. Champs Technologies responsibility is limited to the use of its component as described in the Data Sheet and any warranty express or implied is limited to component replacement if found defective.



- ELECTRICAL INFORMATION:**
 TURNS RATIO [8-13] : [2-6] = 0.065 +/-2%
- DCR [2-6]= 186 mohm Nom, [8-10] = [11-13] = 1.38 mohm Nom,
 - Inductance [2-6] = 1.2mH Nom, 1.08 Min, 1.32 Max @100KHz, 1.0 VRMS @ 25C
 - Leakage Inductance [2-6]= Short [8-13] = 4.0 uH Nom @100 KHz
 - Dielectric Strength 6 Sec Min: [2,6] to [8,13] : Core 3750 VAC II [8,13] :Core 500 Vdc
 - Weight 30 grams Max | RoHS Compliant | Pin Composition Tin/Silver Plating
 - Volt-usec Rating = 1020 @100C
 - Operating Ambient Temp Rating: -55C to +130C [Inclusive of Temp Rise]

No.	DESCRIPTION	REVISIONS	DATE	APPR	
THIRD ANGLE PROJECTION					
CHAMPS TECHNOLOGIES					
DRAWN		SIGN	DATE	Champs No. 80R2-5AC-3125002-1M2	
CHKD		HE	3/5/12	Customer	ISSUE
APPR				Part #:	REV
				SIZE	SCALE 150%
				A	00

Low Profile Wide Vin & Offline Active Clamp Forward : 19-420Vin to 12Vout 120W



- Footprint: 27 wide x 31.5 mm length x 11 mm Height -- Low Profile
- Meets UL and IEC 60950-1 Clearance/Creepage Class II, Reinforced Insulation, Peak Working Voltage 1400Vpk
- Meets IEC 61180-1 Peak Impulse Withstand Voltage 6KV.
- Derived from customer verification in Analog / Linear Ref Design using LT3752 & LT8311 ICs.
- Optimized for Active Clamp Forward Topology & Wide Input Range.
- Typical Efficiency 93-94%. Typical Temperature Rise 45C above ambient
- Available with Thermal Pad and Heat Sink affording lower Temperature Rise.
- Lowest achievable volume for AC offline applications including lowest achievable Leakage Inductance.
- Multilayer PCB optimization for lowest AC resistance & Proximity Loss Effect. Repeatability by design.
- Wide variety of PNs, Designs and Turns Ratios in stock. If not listed, Contact Us.
- Surface Mount, Thru-Hole, Pad-to-Pad, Embedded Planar Windings as Options.

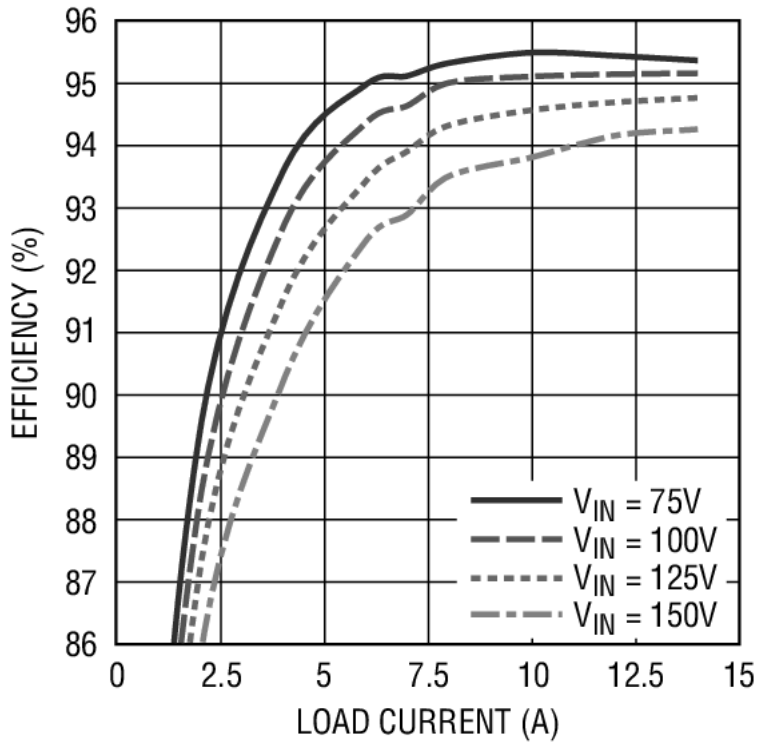
Champs-Tech P26R26LF-AC_Offline Catalog

Table I: P26R26LF-AC_Offline Series 38-430 Vin -- Rated to 120W Output.

Champs PN	Vin (Min)	Vin (Max)	Vout	Iout (A _{dc})	Pout (Watts)	Freq (KHz)	Output Inductor PN
P26R26LF-AC-0303	19	72	12	10.0	120	136	PQI2050-21-11p5-LTC2
P26R26LF-AC-0603	38	180	12	10.0	120	136	PQI2050-21-11p5-LTC2
P26R26LF-AC-3203-2M2	270	420	12	10.0	120	130	PQI2050-21-11p5-LTC2

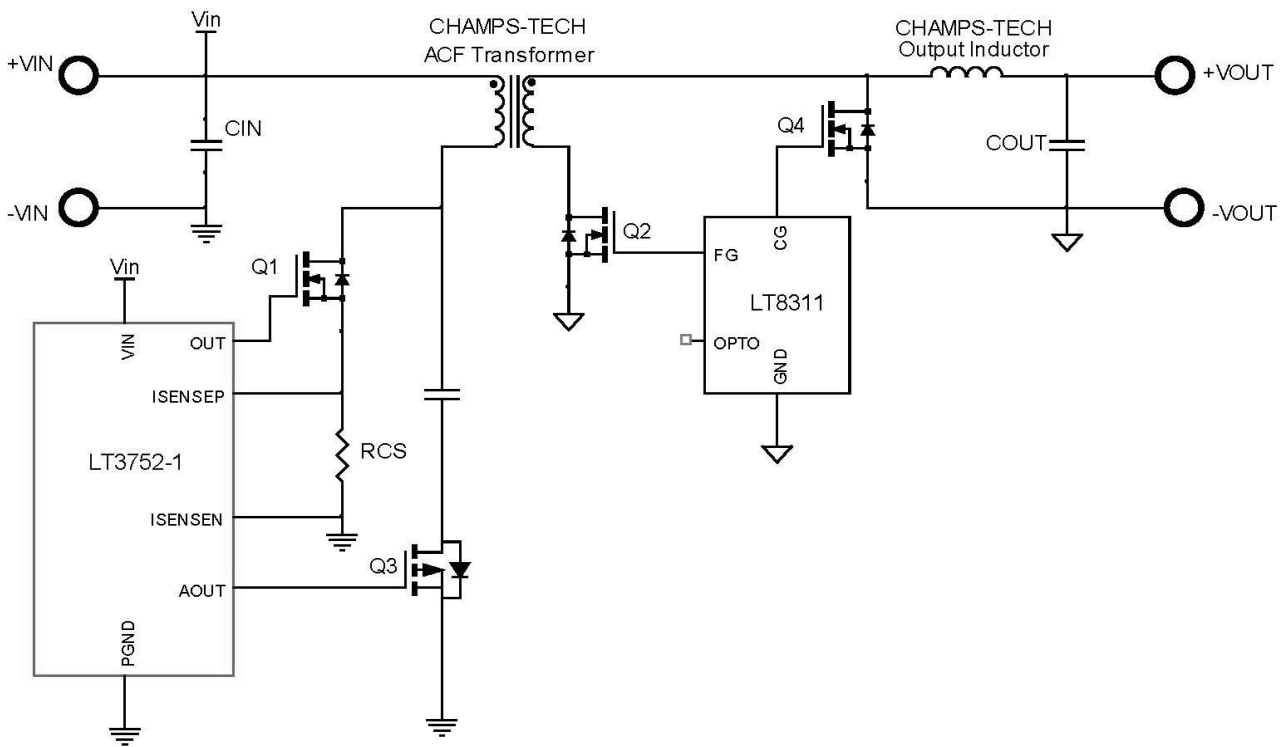
Baseline Reference Design:

<https://www.analog.com/en/design-center/reference-designs/circuit-collections/lt3752-75v-to-150v-24v-14a-340w-no-opto-active-clamp-isolated-forward-converter.html#cc-overview>



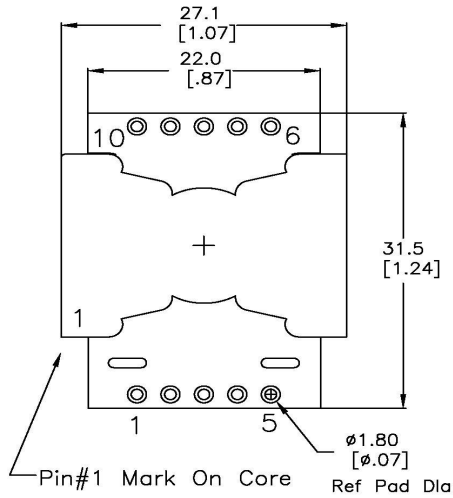
3752 TA08b

Typical Efficiency Curve

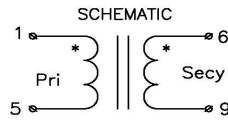
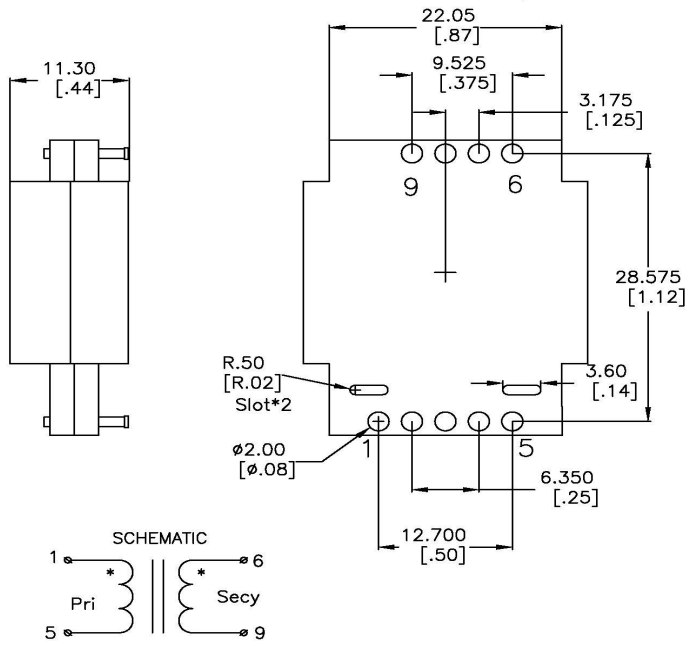


Basic Active Clamp Forward Schematic

MECHANICAL DIMENSIONS [TOP VIEW]

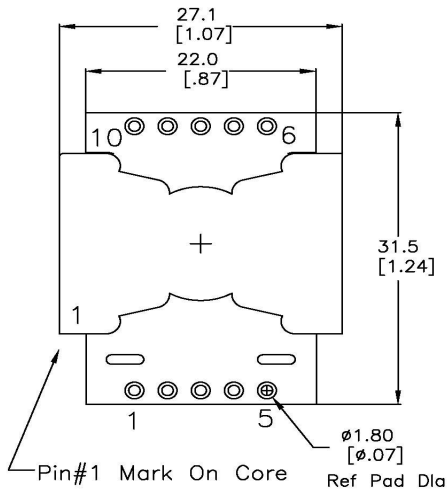


SUGGESTED PAD LAYOUT [PCB TOP VIEW]

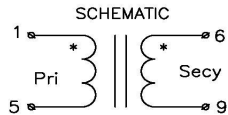
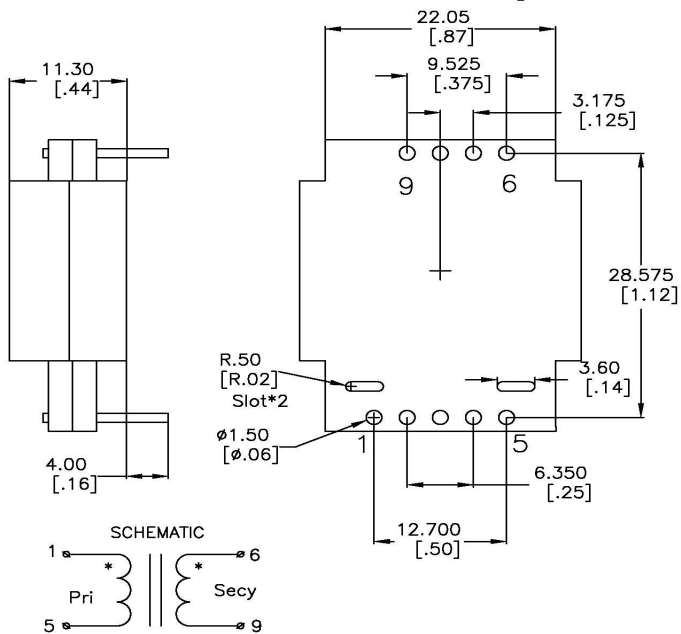


Mechanical Dimensions Drawing P26R26LF-AC Surface Mount

MECHANICAL DIMENSIONS [TOP VIEW]

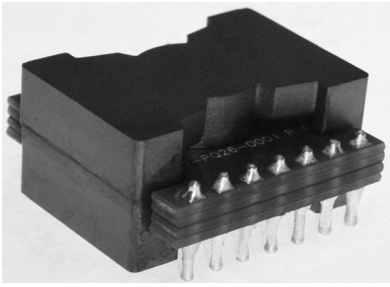


SUGGESTED PAD LAYOUT [PCB TOP VIEW]



Mechanical Dimensions Drawing P26R26LF-AC Thru-Hole

Wide Input Range & Offline Active Clamp Forward : 38-400Vin to 12V, 24V, 28V, 48V, 80 Vout & 140-196W



- Footprint: 27 wide x 32.7 mm length x 15 mm Height
- Meets UL and IEC 60950-1 Clearance/Creepage Class II, Reinforced Insulation, Peak Working Voltage 1400Vpk
- Meets IEC 61180-1 Peak Impulse Withstand Voltage 8KV.
- Derived from customer verification in Analog / Linear Ref Design using LT3752 & LT8311 ICs.
- Optimized for Active Clamp Forward Topology & Wide Input Range.
- Typical Efficiency 94-95%. Typical Temperature Rise 45-65C above ambient
- Available with Thermal Pad and Heat Sink affording lower Temperature Rise.
- Lowest achievable volume for AC offline applications including lowest achievable Leakage Inductance.
- Multilayer PCB optimization for lowest AC resistance & Proximity Loss Effect. Repeatability by design.
- Wide variety of PNs, Designs and Turns Ratios in stock. If not listed, Contact Us.
- Surface Mount, Thru-Hole, Pad-to-Pad, Embedded Planar Windings as Options.

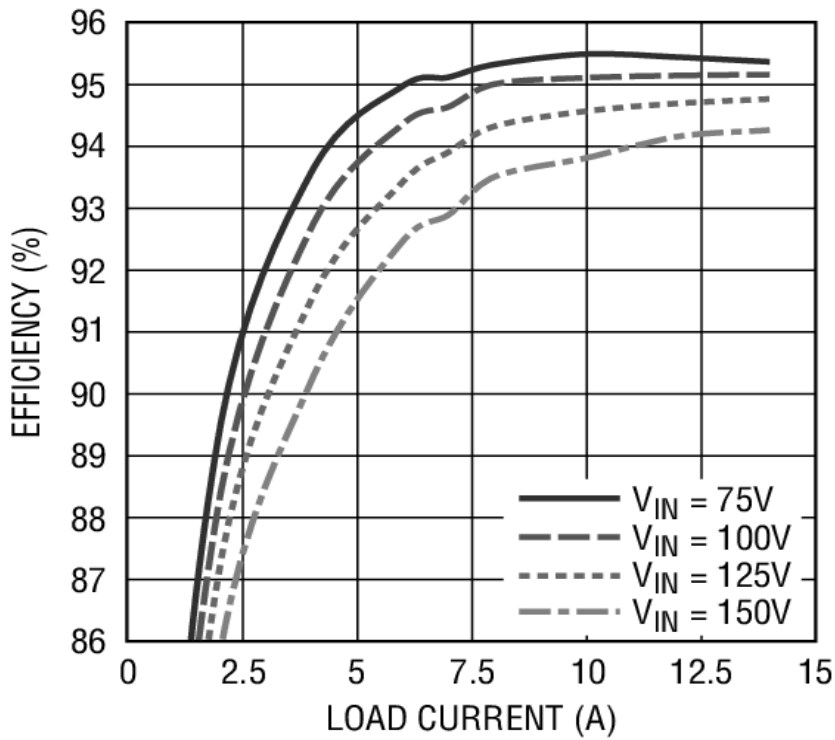
Champs-Tech P26R6-AC_Offline Catalog

Table I: P26R6-AC_Offline Series 38-430 Vin -- Rated to 140-196W Output.

Champs PN	Vin (Min)	Vin (Max)	Vout	Iout (A dc)	Pout (Watts)	Freq (KHz)	Output Inductor PN
P26R6-AC-0603-130R	38	180	12	13.4	160	136	PQI2050-17-14-LTC
P26R6-AC-0606-130R	38	180	24	6.0	144	136	PQA2050-75-7-LTC
P26R6-AC-0607-130R	38	180	28	5.0	140	136	PQA2050-90-LTC
P26R6-AC-0612-130R	38	180	48	3.0	144	136	PQI26-330-LTC
P26R6-AC-0803-200R	50	160	12	12	144	136	PQI2050-17-14-LTC
P26R6-AC-0806-200R	50	160	24	6.0	144	136	PQA2050-75-7-LTC
P26R6-AC-0807-200R	50	160	28	5.0	140	136	PQA2050-90-LTC
P26R6-AC-0812-200R	50	160	48	3.0	144	136	PQI26-330-LTC
P26R6-AC-2004-1M	88	400	12	12	144	100	PQI26-25R-18-HX
P26R6-AC-2006-1M	88	400	18	8.0	144	100	PQI26-58R-10-LTC
P26R6-AC-2008-1M	88	400	24	6.0	144	100	PQI26-130-LTC
P26R6-AC-2010-1M	88	400	28	5.0	140	100	PQI26-155-LTC
P26R6-AC-2016-1M	88	400	48	3.0	144	100	PQI26-330-LTC
P26R6-AC-2604-1M2	150	400	12	15	180	100	PQI26-18R-16-HX
P26R6-AC-2608-1M2	150	400	24	7.5	180	100	PQI26-78R-LTC
P26R6-AC-2610-1M2	150	400	28	5.0	140	100	PQI26-155-LTC
P26R6-AC-2616-1M2	150	400	48	3.5	168	100	PQI26-330-LTC
P26R6-AC-3203-2M	270	400	12	15	180	130	PQI26-15R-17-HX
P26R6-AC-3206-2M	270	400	24	8.0	192	130	PQI26-54R-11-LTC
P26R6-AC-3207-2M	270	400	28	7.0	196	130	PQI26-68R-LTC
P26R6-AC-3212-2M	270	400	48	4.0	192	130	PQI26-220-LTC

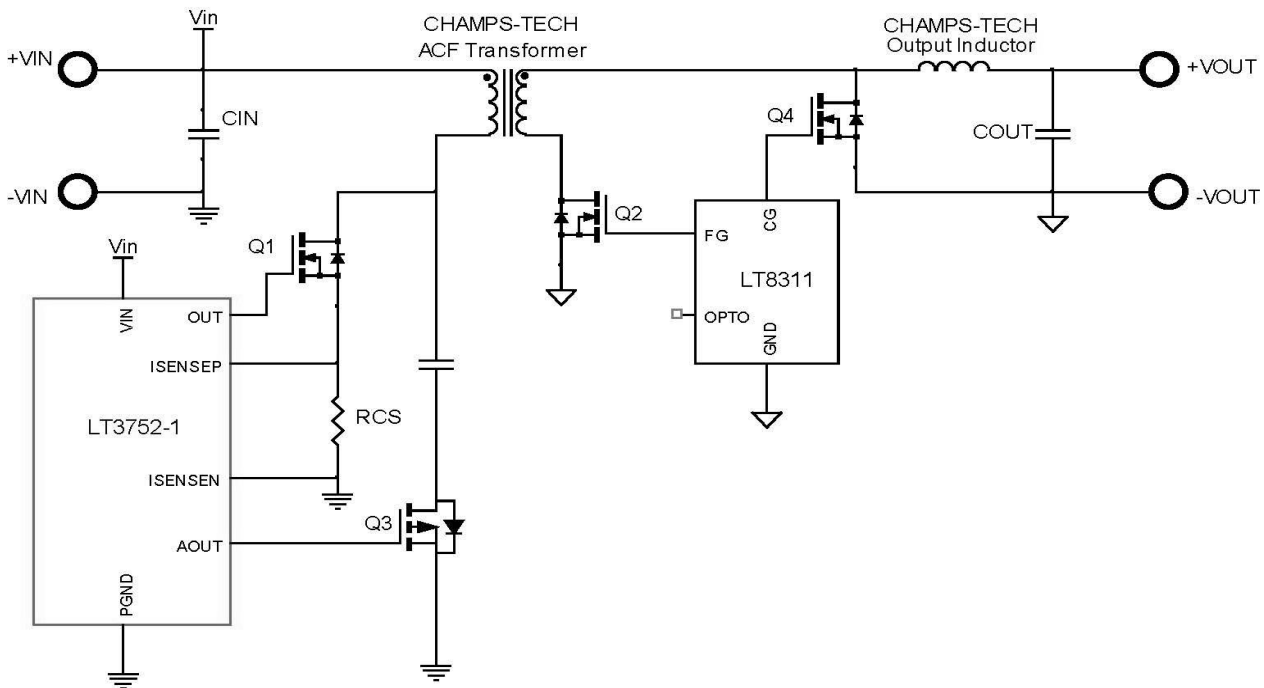
Baseline Reference Design:

<https://www.analog.com/en/design-center/reference-designs/circuit-collections/lt3752-75v-to-150v-24v-14a-340w-no-opto-active-clamp-isolated-forward-converter.html#cc-overview>



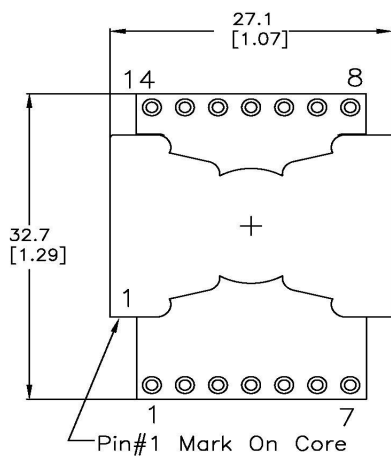
3752 TA08b

Typical Efficiency Curve

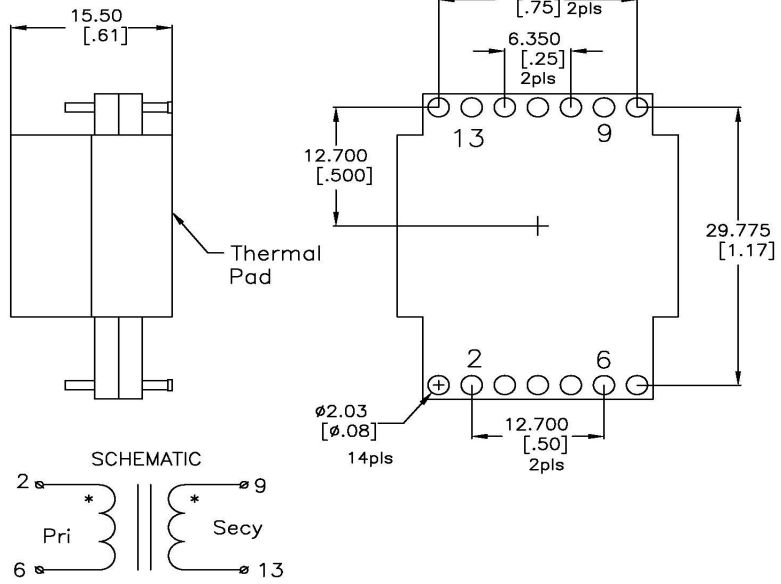


Basic Active Clamp Forward Schematic

MECHANICAL DIMENSIONS [TOP VIEW]

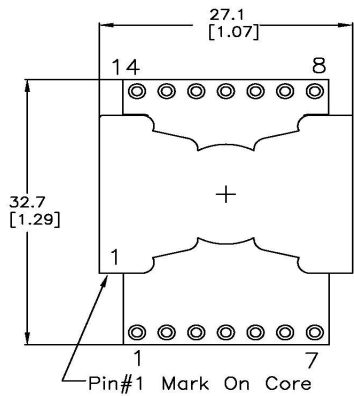


SUGGESTED PAD LAYOUT [PCB TOP VIEW]

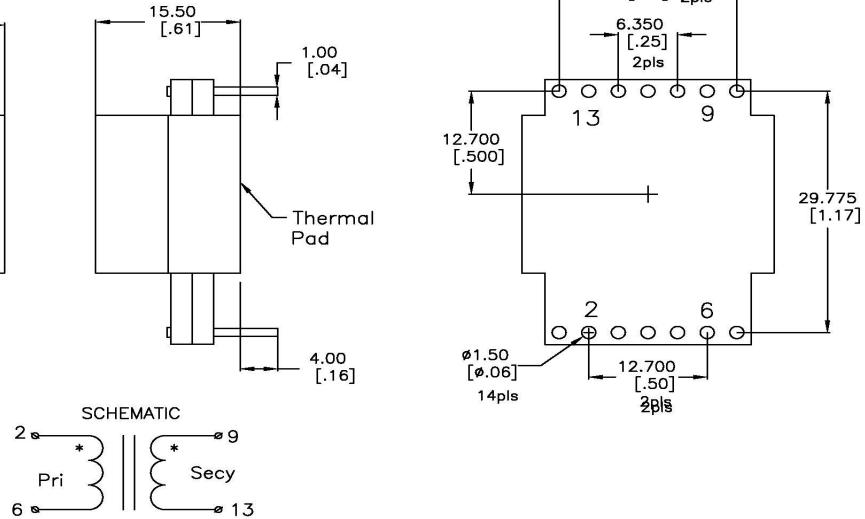


Mechanical Dimensions Drawing P26R6-AC Surface Mount

MECHANICAL DIMENSIONS [TOP VIEW]



SUGGESTED THRU-HOLE LAYOUT [PCB TOP VIEW]



Mechanical Dimensions Drawing P26R6-AC Thru-Hole

80R2 Series Dual Output Active Clamp Forward DC1929A Reference Designs



- Forward Active Clamp Topology -- Highest Efficiency attributable to Planar.
- Aggressive Interleave by design results in lowest achievable Leakage Inductance.
- Multilayer PCB optimization for lowest AC resistance and Proximity Effect.
- Click on Part Number in Table below for the Data Sheet.
- Wide variety of Turns Ratios in stock but not shown in Table.
- Contact Us for Module Design and SM Assy of Converter

Table I: 80R2 Series Dual Output -- Part Numbers and Data Sheets

Champs PN	V _{in} (Min)	V _{in} (Max)	V _{out1}	I _{o1}	I _{o1} Max	V _{out2}	I _{o2}	I _{o2} Max	Companion Output Inductors
80R2-AC-240202D	140	400	5	15.0	30.0	5	15.0	30.0	PQI26LF-0404-4R8
80R2-AC-240205D	140	400	5	15.0	30.0	12	6.0	10.0	<u>PQI26R6-0410-4R8</u>
80R2-AC-220410D	140	400	12	6.0	10.0	30	1.6	5.0	PQI26R6-1025-33R
80R2-AC-220404D	140	400	12	6.0	10.0	12	6.0	10.0	PQI26R6-1010-33R
80R2-AC-220808D	140	400	24	3.0	4.0	24	3.0	4.0	PQI26R6-2020-90R
80R2-AC-221010D	140	400	28	2.5	3.5	28	2.5	3.5	PQI26R6-2222-120R
80R2-AC-221616D	140	400	54	1.5	2.0	54	1.5	2.0	PQI26R6-2525-300R

Notes:

1. In all cases Champs Technologies makes no representation as to suitability of the Analog Device / Linear Tech DC1929A Reference Design itself. That is the design responsibility and Intellectual Property of Analog Devices / Linear Technology.

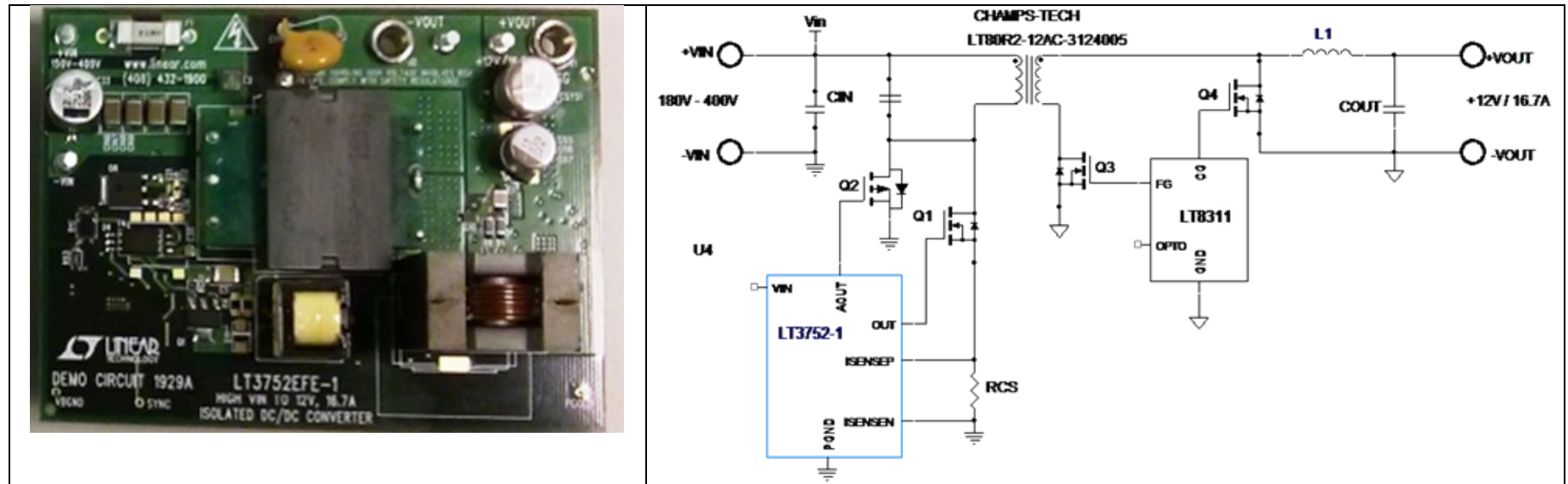
2. Champs Technologies responsibility is limited to the use of its component as described in the Data Sheet and any warranty express or implied is limited to component replacement if found defective.

Table II: PQI26R6 Series Dual Output Companion Output Inductors

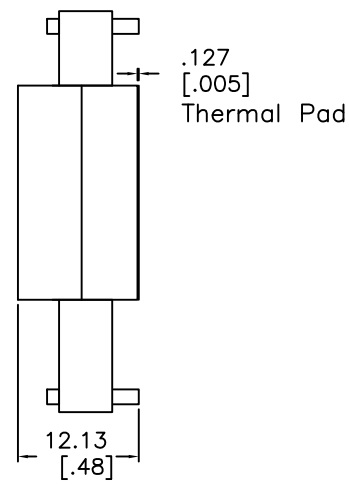
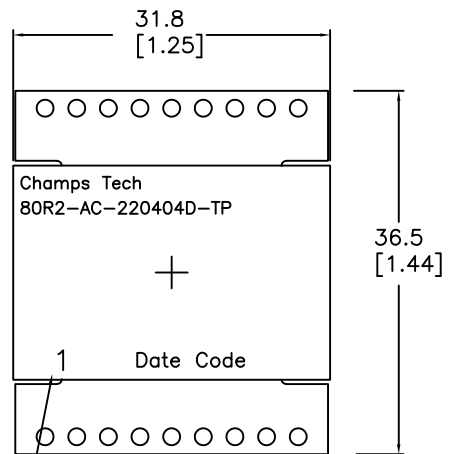
Champs PN	L _{1nom} (uH)	L _{1min} (I _{rat} A)	I _{rated1} Adc	I _{sat1}	L _{2nom} (uH)	L _{2min} (I _{rat} A)	I _{rated2} Adc	I _{sat2}
PQI26LF-0404-4R8	4.8	4.3	16.0	18.0	4.8	4.3	16.0	18.0
PQI26R6-0410-4R8	4.8	4.3	16.0	18.0	30.0	27.0	6.0	7.2
PQI26R6-1025-33R	33.0	29.5	9.0	10.5	206	185	2.0	2.5
PQI26R6-1010-33R	33.0	29.5	9.0	10.5	33.0	29.5	9.0	10.5
PQI26R6-2020-90R	90.0	80.0	3.0	4.8	90.0	80.0	3.0	4.8
PQI26R6-2222-120R	120.0	108.0	2.5	3.25	120.0	108.0	2.5	3.25
PQI26R6-2525-300R	300.0	270.0	1.5	2.0	300.0	270.0	1.5	2.0

Notes:

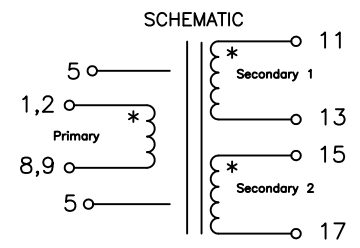
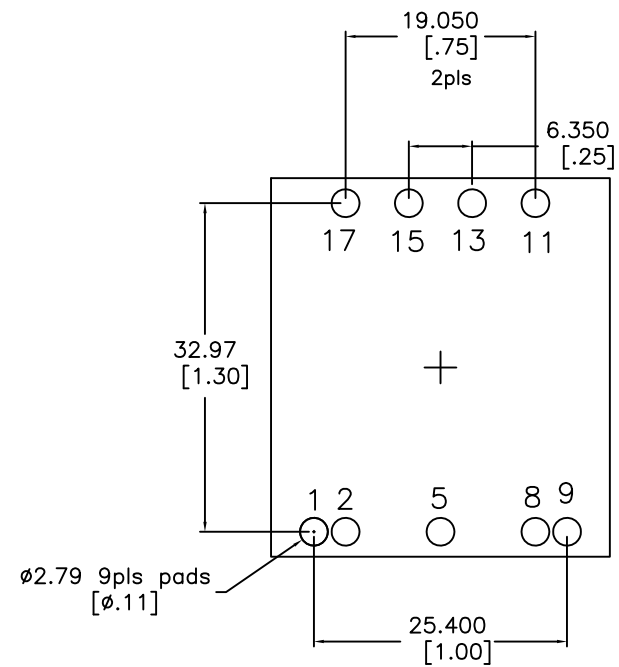
1. I_{rated} values shown are the sum total of outputs #1 and #2 operating simultaneously to their nominal respective rated loads as shown in Table II.
2. I_{sat} values shown are the sum total of outputs #1 and #2 operating simultaneously to their maximum respective rated loads without saturating as shown in Table II.



Mechanical Dimensions [Top View]



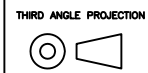
Suggested SM Layout [PCB Top View]



ELECTRICAL INFORMATION:

1. TURNS RATIO [11-13] : [1,2-8,9] = 0.182 ±2%, [15-17] : [1,2-8,9] = 0.182 ±2%
2. DCR [1,2-8,9]= 74 mohm Nom, 88 Max 60 Min
DCR [11-13] & [15-17] = 5.2 Mohms Nom, 6.2 Max, 4.5 Min
3. Inductance [1,2-8,9] = 2.6 mH Nom, ±25% at 100KHz, 1.0 VRMS @ 25C
4. Leakage Inductance [1,2-8,9]= Short 11 to 17 = 2.5 uH Nom, 3.5 Max @100 KHz
5. Capacitance [1,2,8,9] : [5] = 280pF Nom, 365 Max || [11,15] : [5] = 170pF Nom, 225 Max || [1,2,8,9] : [11,15] = 105pF Nom, 135 Max
6. Dielectric Strength 3 Sec Min 1,2-8,9 : 5 : Core > 1000 VDC || 5 : Core > 1000 Vdc
Dielectric Strength 1,2,8,9,5: 11,13,15,17 > 1500 VAC || 11,13 : 15,17 > 500 Vdc
7. RoHS & REACH Compliant I Pin Composition 96/4 Tin/Silver Plating
8. Temperature Rating: -55C to +130C [Inclusive of Temp Rise]

CHAMPS TECHNOLOGIES

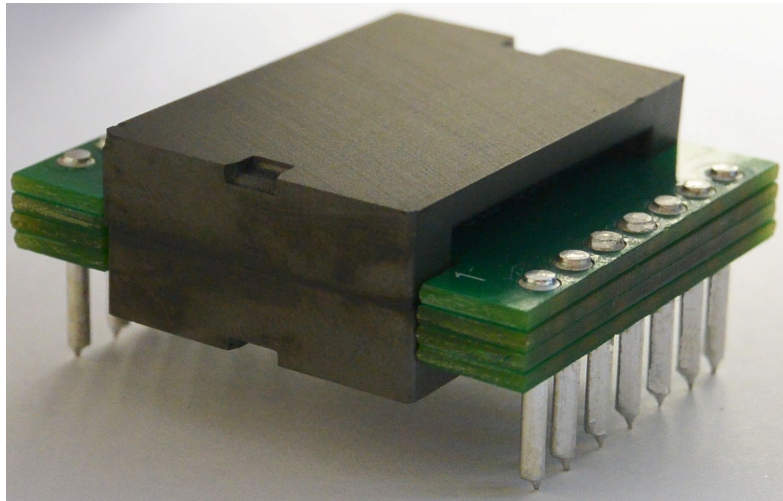


TOLERANCES UNLESS OTHERWISE INDICATED	
.XXX	± .25
.XX	± 0.38
.X	± 0.78

DRAWN	HE	02.15.17	PN:	80R2-AC-220404D-TP	ISSUE	REV
CHKD			SIZE	SCALE 150%	A	00
APPR						

No.	REVISIONS	DATE	APPR

Railway Apps: 50-160Vin to 5V, 12V, 24V, 54V, 80 Vout to 240W Active Clamp Forward



- Footprint: 31.8 wide x 36.8 mm length x 12.6 mm Height
- Proven in actual Analog / Linear Ref Design using LT3752 & LT8311 ICs.
- Optimized for Active Clamp Forward Topology.
- Typical Efficiency 94-95%
- Aggressive Interleave planar construction -- lowest achievable Leakage Inductance.
- Multilayer PCB optimization for lowest AC resistance & Proximity Loss Effect.
- Wide variety of PNs, Designs and Turns Ratios in stock. If not listed, Contact Us.
- Integer Turns 1 thru 16 Available [Contact Us if Not Shown in Table].
- Available with Thermal Pad or Heat Sink.
- Surface Mount, Thru-Hole, Pad-to-Pad, Embedded Planar Windings as Options.

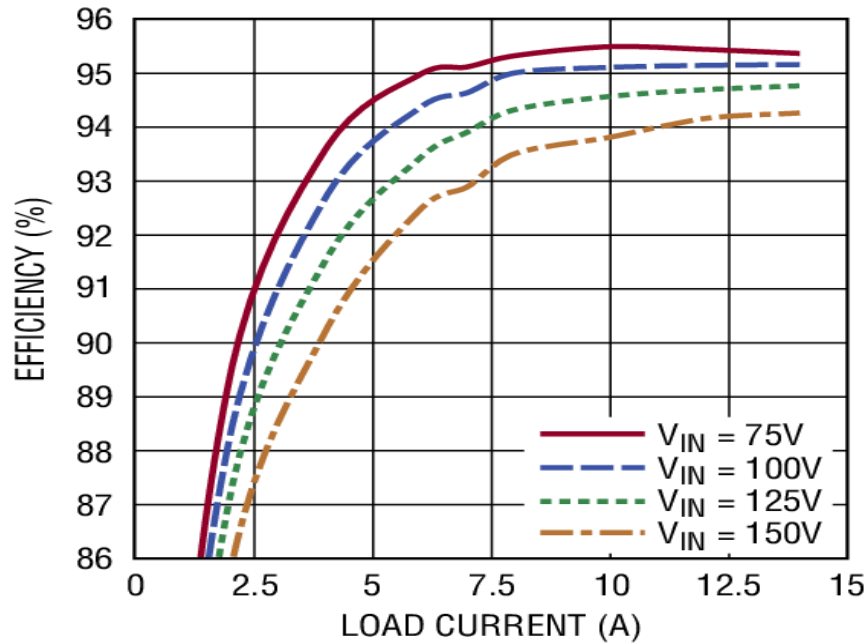
Table I: 80R6 & P26R6 Series 50-180 Vin Rated to 240W Output.

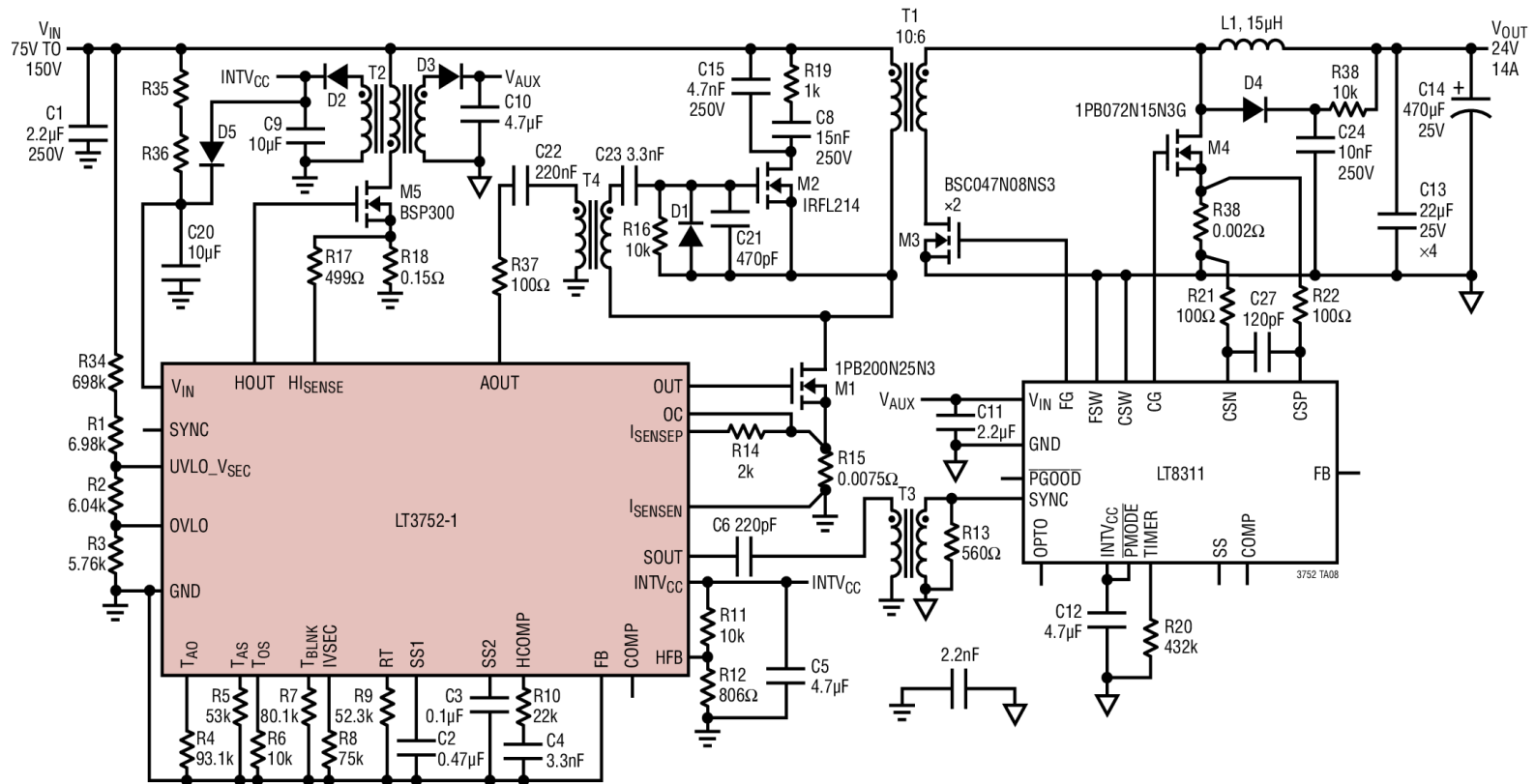
Champs PN	Vin (Min)	Vin (Max)	Vout	Iout (A dc)	Pout (Watts)	Freq (KHz)	Output Inductor PN
80R6-0806-150R	50	160	24	10.0	240	100-200	PQI26-33R-LTC
P26R6-0806-03-150R	50	160	24	10.0	240	100-200	PQI26-33R-LTC
80R6-0803-150R	50	160	12.0	20.0	240	100-200	PQI2050-08-HX
P26R6-0803-03-150R	50	160	12.0	20.0	240	100-200	PQI2050-08-HX

80R61302-250R	50	150	5.0	40.0	200	100-200	PQI2050-2R0-HX
80R6-1402-250R	60	180	5.0	40.0	200	100-200	PQI2050-2R0-HX
80R6-0814-S02	50	150	54	3.0	162	100-200	PQI26-330-LTC
P26R6-0814-02-S01	50	150	54	3.0	162	100-200	PQI26-330-LTC
80R6-1020-300R	60	150	80	3.0	240	100-200	PQI26-330-LTC
80R6-2012-1M2	130	250	50.0	4.0	200	100-200	PQI26-130-LTC

Baseline Reference Design:

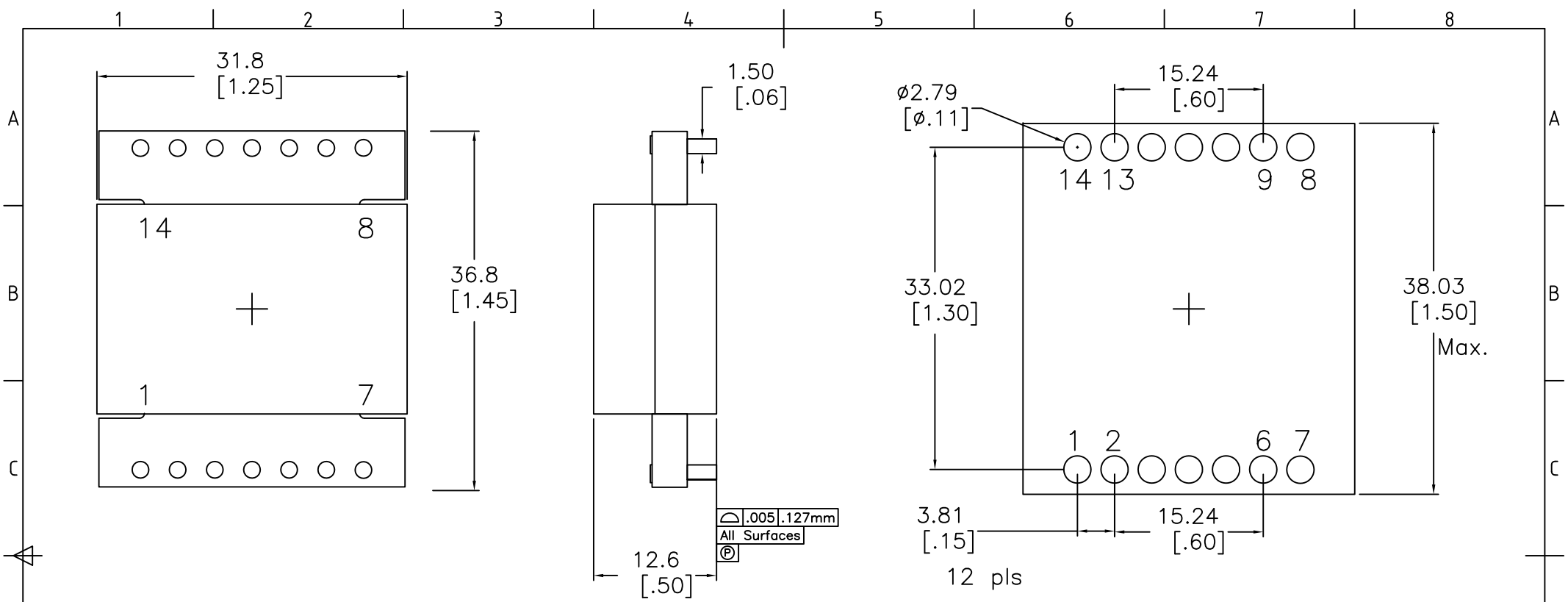
<https://www.analog.com/en/design-center/reference-designs/circuit-collections/lt3752-75v-to-150v-24v-14a-340w-no-opto-active-clamp-isolated-forward-converter.html#cc-overview>





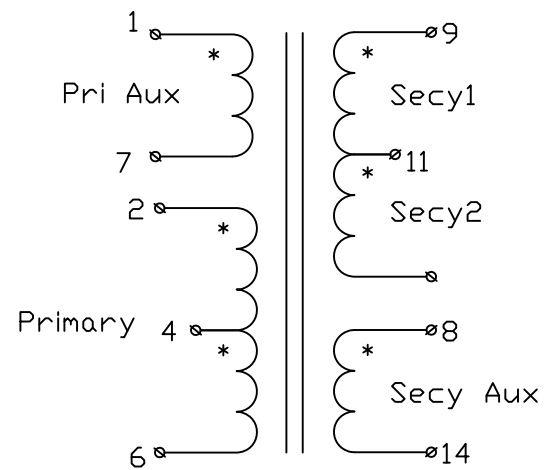
- T1: CHAMPS LT80R2-12AC-1006
- T2: WÜRTH 750817020
- T3: PULSE PE-68386NL
- T4: ICE GT05-111-100
- L1: COILCRAFT AGP2923-153
- D1, D2, D3, D4: CENTRAL SEMI CMR1U-10
- D5: BAS516
- D6: CENTRAL SEMI CMMR1U-02

Reference Design Schematic

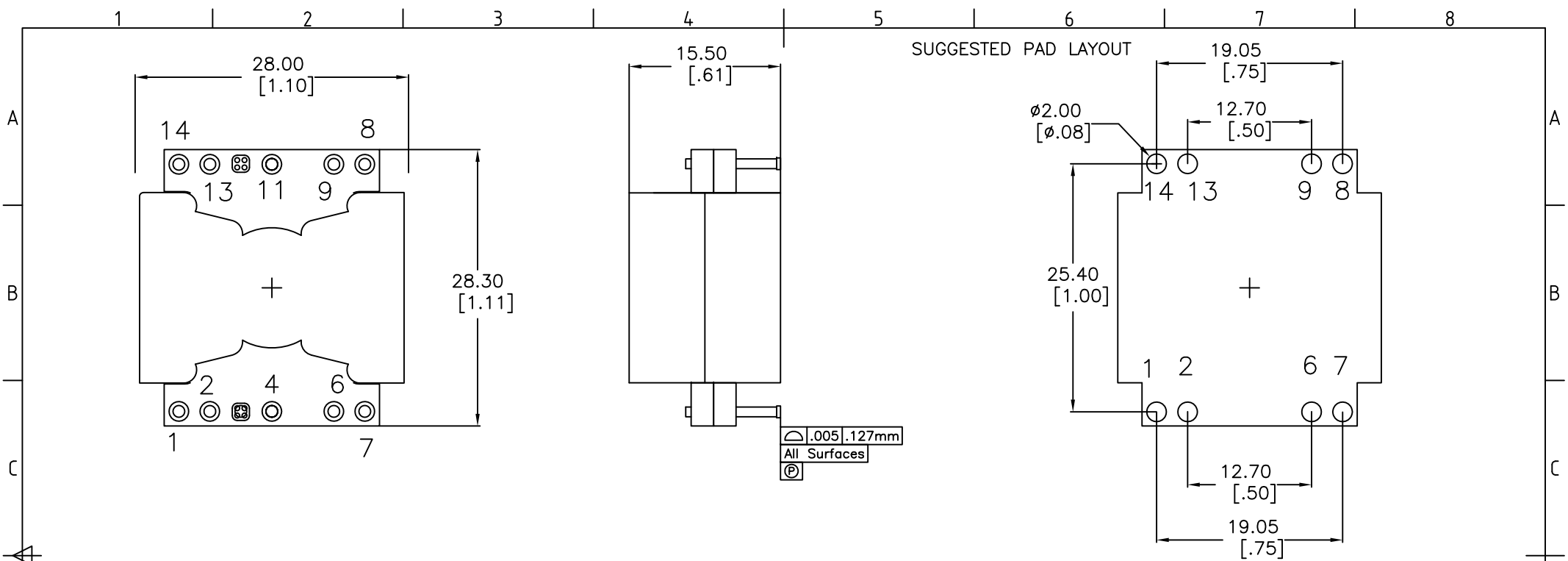


Electrical Information:

1. TURNS Ratio [9-13] : [2-6] = 0.375 +/--2%
2. INDUCTANCE [2-6] = 150 uH Nom @100kHz/1.0V
3. LEAKAGE INDUCTANCE [2-6] : SHORT 9,11 = 500 nH Max @100kHz
4. DCR [2-6] = 11 mohms Nom, DCR [9-13] = 1.73 mohms Nom, DCR [1-7] = [8-14] = 50 mohm max
5. CAPACITANCE 2,6 to 9,13 = 380 pF Max @100kHz
6. DIELECTRIC ISOLATION: [2,6],[1,7] : [9,13] > 2500 Vrms
DIELECTRIC ISOLATION: [9,13] : CORE > 500 Vdc
7. RoHS Level 6/6 Compliant | Pins 96/4 Sn/Ag Plating
8. Operating Temp Range: -55C To +130C [Inclusive of Temp Rise]



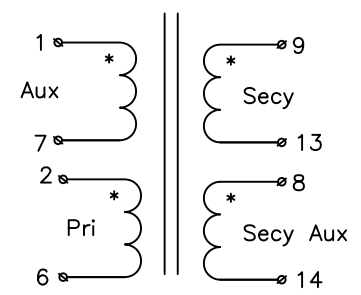
					CHAMPS TECHNOLOGIES	TOLERANCES UNLESS OTHERWISE INDICATED .xxx ± .25 .xx ± .51 ANGLE ± 1.0	DRAWN	JL	7/9/15	TITLE: 80R6-0803-150R		ISSUE	REV
							CHKD	PH			SIZE	SCALE 2:1	A
No.	DESCRIPTION	REVISIONS	DATE	APPR			APPR	DT					



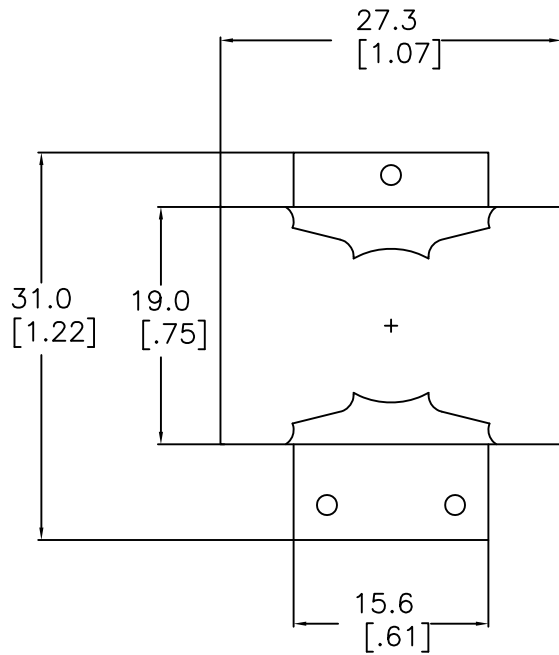
Electrical Information:

1. TURNS RATIO [9-13] : [2-6] = 0.375 +/-2% || [1-7] : [2-6] = 0.375
2. INDUCTANCE [2-6] = 150 uH Nom +/-10% @100kHz/1.0V
3. LEAKAGE INDUCTANCE [2-6] : SHORT 9,13 = 150 nH Max @100kHz
4. DCR [2-6] = 25 mohms Nom, DCR [9-13] = 4 mohms Nom, DCR [1-7] = [8-14] = 50 mohm max
5. CAPACITANCE 2,6 to 9,13 = 450 pF Max @100kHz
6. DIELECTRIC ISOLATION: [2,6],[1,7] : [9,13] > 2500 Vrms
DIELECTRIC ISOLATION: [9,13] : CORE > 500 Vdc
7. RoHS Level 6/6 Compliant | Pins 96/4 Sn/Ag Plating
8. Operating Temp Range -55C to +130C [Inclusive of Application Temp Rise]
9. Storage Temp Range -55C to +130C [Materials rated to +170C]

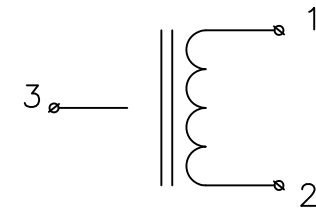
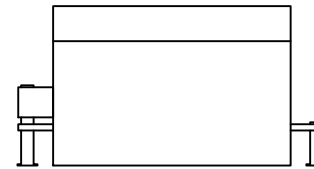
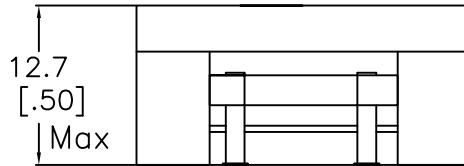
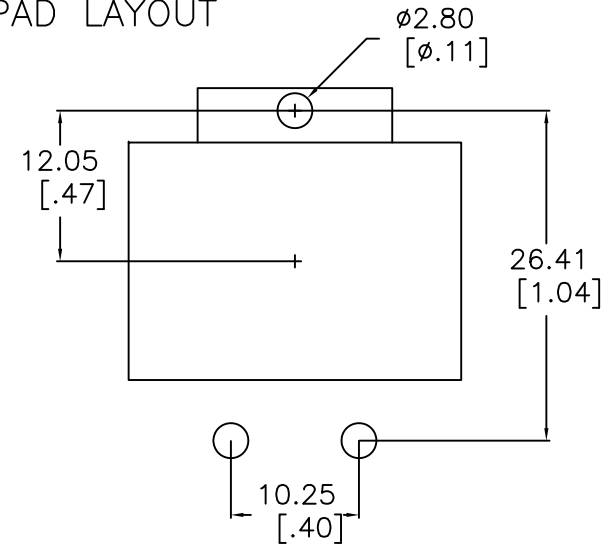
Schematic



No.	DESCRIPTION	REVISIONS	DATE	APPR
THIRD ANGLE PROJECTION				
CHAMPS TECHNOLOGIES				
TOLERANCES +/- 1.0 UNLESS OTHERWISE INDICATED		SIGN	DATE	Champs No. P26R6-0803-03-150R
.XXX ±	DRAWN	JL	12/2/14	Customer
.XX ±	CHKD	PH		Part #:
.X ±	APPR	DT		ISSUE A
ANGLE ±				REV 00
			SIZE	SCALE 2:1



SUGGESTED PAD LAYOUT



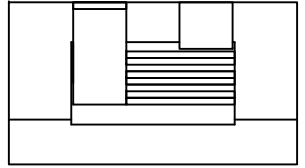
NOTES:

1. INDUCTANCE [1-2] = 330 uH Nom, ±10% @100kHz 1.0V 4.0 Adc
2. INDUCTANCE [1-2] = 280 uH Min @100kHz 1.0V 4.8 Adc @25C
3. DCR [1-2] = 69 mohms Nom, 81 Max
4. DIELECTRIC ISOLATION > 500 VDC [1-2], : CORE
5. SATURATION CURRENT @25C = 4.8 Adc | @100C = 4.0 Adc
6. HEATING CURRENT FOR 45C RISE AT 25C AMBIENT = 6 Adc
7. Operating Ambient Temperature: -55C to +130C [Inclusive of Temps Rise]
8. RoHS Level 6/6 Compliance || 96/4 Sn/Ag Pin Composition

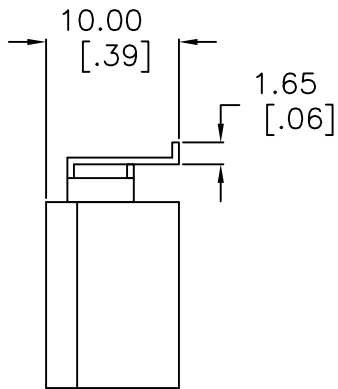
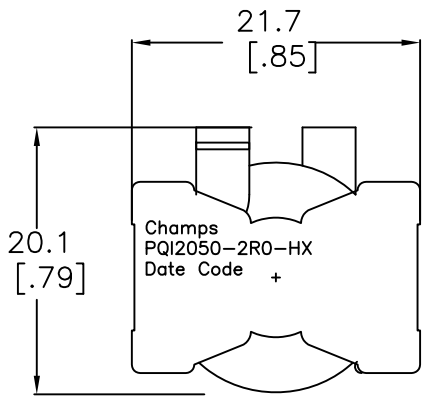
No.	DESCRIPTION	REVISIONS	DATE	APPR
CHAMPS TECHNOLOGIES				
DRAWN		SIGN	DATE	Champs No. PQI26-330-LTC
CHKD				Customer ISSUE
APPR			09.18.15	Part #: A REV
			SIZE	SCALE 2:1

1 2 3 4 5 6 7 8

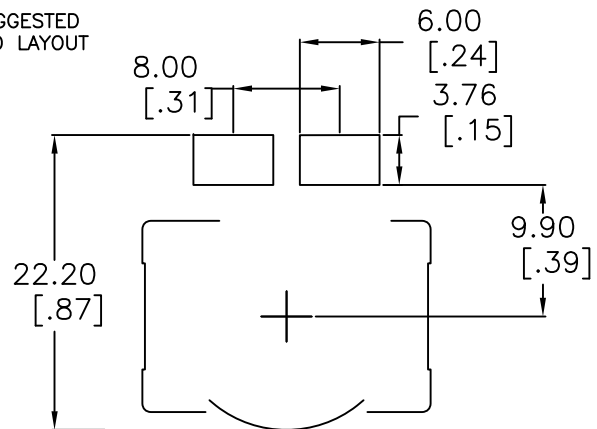
A



B

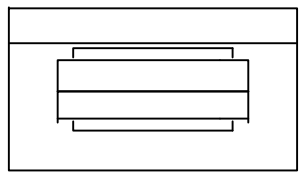


SUGGESTED PAD LAYOUT



C

D

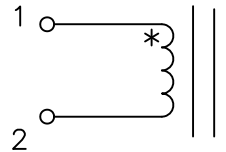


E

F

INDUCTANCE [1-2] = 2.0uH Nom, 1.80 Min. @100kHz 1.0V 40Adc
 INDUCTANCE [1-2] = 1.65 uH Min @100kHz 1.0V 45Adc
 DCR [1-2] = 1.00 mohms Nom, 1.25 Max
 DIELECTRIC ISOLATION > 500 VDC [1-2] : CORE
 SATURATION CURRENT @25C = 45.0Adc | @85C = 42.0Adc
 HEATING CURRENT FOR 40C RISE AT 25C AMBIENT = 45 Adc

Schematic



No.		DESCRIPTION		REVISIONS	DATE	APPR
THIRD ANGLE PROJECTION						
CHAMPS TECHNOLOGIES						
TOLERANCES +/- 1.0 UNLESS OTHERWISE INDICATED		SIGN	DATE	Champs No. PQI2050-2R0-HX		
.XXX ± 0.180	DRAWN	DK	3/5/15	Customer	INDUCTOR	ISSUE
.XX ± 0.38	CHKD			Part #:		REV
.X ± 1.5	APPR	HE		SIZE	SCALE 2:1	00
ANGLE ±						