

# ULTRA LOW DISTORTION LINE MATCHING TRANSFORMER

# P3176

## Features

- \* Lead-free (Pb-free)
- \* RoHS compliant
- \* Low Distortion
- \* 12.6mm (0.5") seated height
- \* Extended Frequency Response
- \* IEC 60950 and UL 60950 certified
- \* UL Recognized Component
- \* Flat TX and RX Responses
- \* High Thermal Stability

## Applications

- \* V.90 and V.92 modems

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## DESCRIPTION

P3176 is intended for V.90 and V.92 (56kbps) modems and other high-speed applications where low distortion at high power levels and very low voiceband frequencies is required at a competitive price.

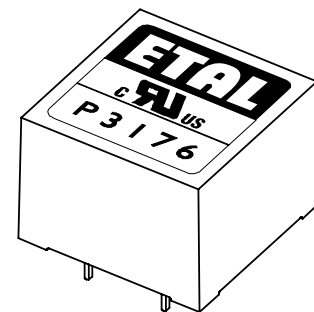
P3176 is mechanically compatible with industry standard P1200 and P2001 and electrically and mechanically compatible with P3146.

P3176 has extended flat frequency response from 30Hz to 4kHz with very low levels of signal distortion at signal frequencies as low as 150Hz.

P3176 also exhibits stable characteristics over its operating temperature range to maximize data throughput under varying environmental conditions without the need for modem retraining.

P3176 meets international safety standards, being vacuum encapsulated and 100% tested to withstand 6.5kV. The part is completely lead-free, compliant with RoHS Directive 2002/95/EC, and suitable for lead-free and conventional processing.

P3176 is certified to IEC 60950 and UL 60950. P3176 is a UL Recognized Component and is supported an IEC CB Test Certificate.



## SPECIFICATIONS

### Electrical

At T = 25°C and as circuit Fig. 2 unless otherwise stated.

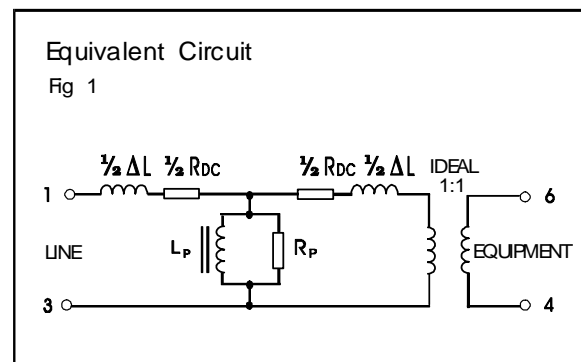
Parameter	Conditions	Min	Typ	Max	Units
Insertion Loss	f = 2kHz, R <sub>L</sub> = 510Ω	-	2.5	-	dB
Frequency Response	LF -3dB cutoff	-	10	-	Hz
	HF -3dB cutoff	-	6	-	kHz
	100Hz - 4kHz	-	±0.6	-	dB
Return Loss	200Hz - 4kHz	16	-	-	dB
Third Harmonic Distortion <sup>(1)</sup>	450Hz 0dBm in line	-	-85	-	dBm
	150Hz -3dBm in line	-	-78	-	dBm
Saturation	Excitation 50Hz	-	-	10	Vrms
	250Vrms. Output voltage across line	-	-	65	Vpeak
Voltage isolation <sup>(2)</sup>	50Hz	3.88	-	-	kVrms
	DC	5.5	-	-	kV
Operating range: Functional Storage	Ambient temperature	-25	-	+85	°C
		-40	-	+125	°C

Lumped equivalent circuit parameters as Fig. 1

DC resistance, R <sub>DC</sub> <sup>(3)</sup>	Sum of windings	180	-	220	Ω
Leakage inductance ΔL		22.3	-	27.7	mH
Shunt inductance L <sub>p</sub> <sup>(4)</sup>	10mV 200Hz	8.5	11	-	H
Shunt loss R <sub>p</sub> <sup>(4)</sup>	10mV 200Hz	17	25	-	kΩ

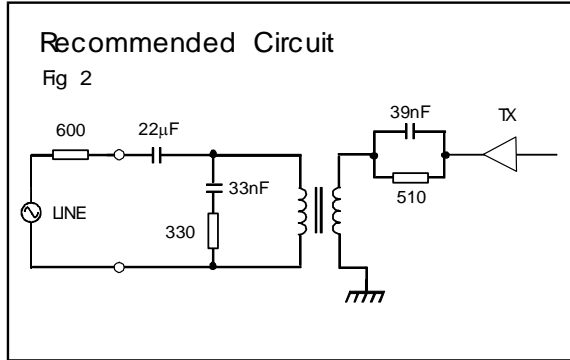
### Notes

1. Third harmonic typically exceeds other harmonics by 10dB.
2. Components are 100% tested at 6.5kV DC.
3. Caution: do not pass DC through windings. Telephone line current, etc. must be diverted using semiconductor line hold circuit.
4. At signal levels greater than 100mV, L<sub>p</sub> will increase and R<sub>p</sub> will decrease slightly but the effect is usually favourable to the return loss characteristic.

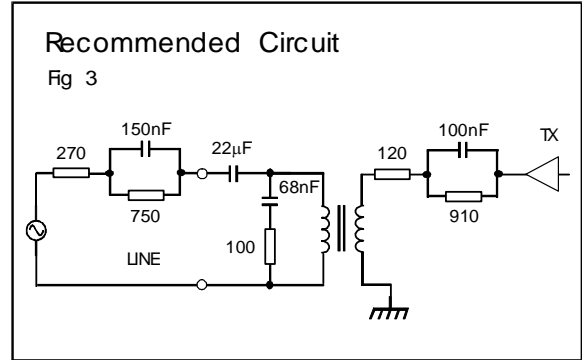


**MATCHING RECOMMENDATIONS**

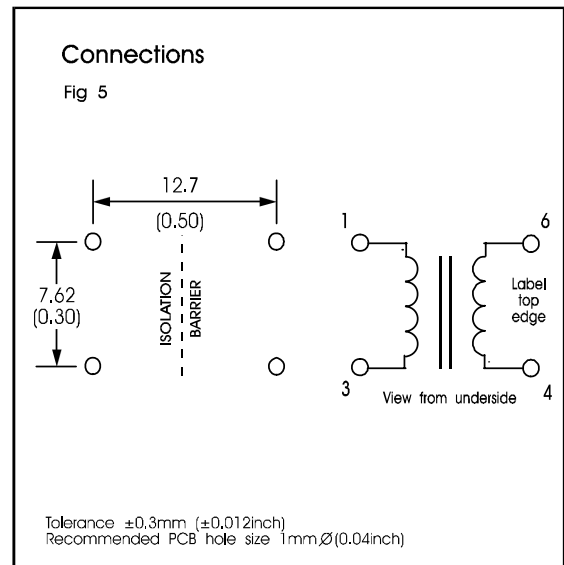
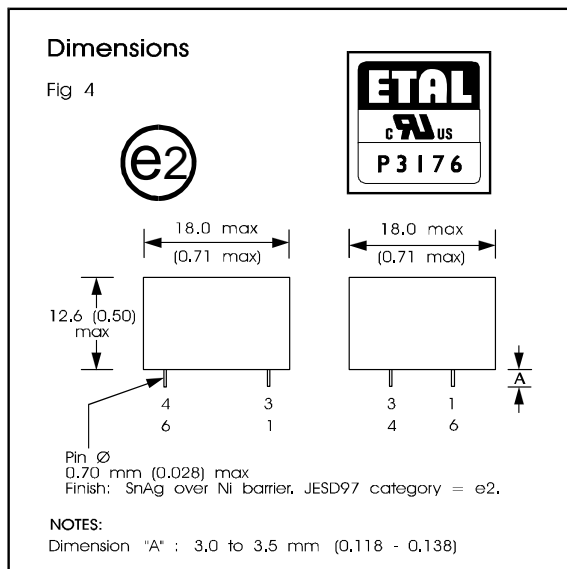
**600Ω MATCH**



**EUROPEAN CTR21 COMPLEX MATCH**



**CONSTRUCTION**



Dimensions shown are in millimetres (inches).  
Geometric centres of outline and pin grid coincide within a tolerance circle of 0.6mmØ.  
Windings may be used interchangeably as primary or secondary.

## SAFETY

Constructed in accordance with IEC 60950-1:2001, EN 60950-1:2001 and UL 60950-1 First Edition, supplementary insulation, 250Vrms maximum working voltage, flammability class V-0. Distances through solid insulation 0.4mm minimum.

## CERTIFICATION

Certified under the IEC CB scheme (Certificate DK-9431) to IEC 60950-1:2001, sub-clauses 1.5, 1.5.1, 1.5.2, 1.7, 1.7.1, 2, 2.9, 2.9.1, 2.9.2, 2.9.3, 2.10, 2.10.1, 2.10.2, 2.10.3, 2.10.3.1, 2.10.3.3, 2.10.4, 2.10.5, 2.10.5.1, 2.10.5.4, 4, 4.7, 4.7.1, 4.7.3, 4.7.3.1, 4.7.3.4, 5, 5.2, 5.2.1, and 5.2.2 for a maximum working voltage of 250Vrms, nominal mains supply voltage not exceeding 300Vrms and a maximum operating temperature of 85°C in Pollution Degree 2 environments, supplementary insulation, including national differences for Denmark, Finland, Germany, Norway, Sweden, Switzerland, USA, Canada and UK. Recognized under the Component Recognition Program of Underwriters Laboratories Inc. to US and Canadian requirements CAN/CSA C22.2 No. 60950-1-03/UL60950-1, First Edition, based on IEC 60950-1, First Edition, maximum working voltage 250Vrms, Pollution Degree 2, reinforced insulation.

UL File number E203175.

Additionally, Profec Technologies certifies all transformers as providing voltage isolation of 3.88kVrms, 5.5kV DC minimum. All shipments are supported by a certificate of conformity to current applicable safety standards.

## ABSOLUTE MAXIMUM RATINGS

(Ratings of components independent of circuit).

Short term isolation voltage (1s)	4.6kVrms, 6.5kVDC
DC current	100 $\mu$ A
Storage temperature	-40°C to +125°C
Lead temperature, 10s	260°C

## COPYRIGHT

ETAL, P3176, P3146, P1200 and P2001 are Trade Marks of Profec Technologies Ltd. The Trade Mark ETAL is registered at the UK Trade Marks Registry.

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ISO 9001  
FM 25326

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