# MICROPROFILE SMD LINE MATCHING TRANSFORMER

## P3188

### Features

- Surface Mount
- Lead-free (Pb-free)
- RoHS compliant
- 7mm seated height
- Vacuum encapsulated
- IEC 60950 and UL 60950 certified
- UL Recognized Component
- Matches directly to 600Ω lines

### Applications

- Telecommunications
- V.22bis modems
- Voice
- Instrumentation

## DESCRIPTION

P3188 is a microprofile transformer for applications where high performance and safety isolation to international standards are required in an extremely small case size.

Designed specifically as a surface mount device, the P3188 features a 7mm seated height and is vacuum encapsulated and tested to 6500VDC. The part is compliant with RoHS Directive 2002/95/EC, and suitable for lead-free and conventional placement and reflow.

P3188 offers fully reinforced insulation, is ideal for voice telecommunications and low speed data communications, and can be matched to both 600Ω and complex impedance telephone lines.

600Ω telephone lines are matched directly by P3188 without external compensation components.

In instrumentation applications, the P3188 can provide wideband frequency response from 50Hz to 50kHz.

P3188 is certified to IEC 60950 and UL 60950. P3188 is a UL Recognized Component, and is supported by an IEC CB Test Certificate.
**SPECIFICATIONS**

**Electrical**

At $T = 25^\circ C$ and as circuit Fig. 2 unless otherwise stated.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion Loss</td>
<td>$f = 2 \text{kHz}$</td>
<td>-</td>
<td>-</td>
<td>3.5</td>
<td>dB</td>
</tr>
<tr>
<td>Frequency response</td>
<td>200Hz - 4kHz</td>
<td>-</td>
<td>-</td>
<td>±0.2</td>
<td>dB</td>
</tr>
<tr>
<td>Return Loss</td>
<td>200Hz - 4kHz</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>Distortion ($^1$)</td>
<td>$f = 450 \text{Hz}$</td>
<td>-</td>
<td>-</td>
<td>-50</td>
<td>dBm</td>
</tr>
<tr>
<td></td>
<td>0dBm in line, 3rd Harmonic</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>Balance</td>
<td>DC - 5kHz Method TG25</td>
<td>80</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>Saturation</td>
<td>Excitation 50Hz 250Vrms.</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>Vrms</td>
</tr>
<tr>
<td></td>
<td>Output voltage across line</td>
<td>-</td>
<td>-</td>
<td>65</td>
<td>Vpeak</td>
</tr>
<tr>
<td>Voltage isolation ($^2$)</td>
<td>50Hz DC</td>
<td>3.88</td>
<td>-</td>
<td>-</td>
<td>kVrms</td>
</tr>
<tr>
<td>Operating range:</td>
<td>Ambient temperature</td>
<td>-25</td>
<td>-</td>
<td>+85</td>
<td>°C</td>
</tr>
<tr>
<td>Functional</td>
<td></td>
<td>-40</td>
<td>-</td>
<td>+125</td>
<td>°C</td>
</tr>
<tr>
<td>Storage ($^6$)</td>
<td></td>
<td>-</td>
<td>-</td>
<td>95</td>
<td>%R.H.</td>
</tr>
<tr>
<td>Humidity</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Lumped equivalent circuit parameters as Fig. 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sum of windings</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC resistance, $R_{DC}^{(3)}$</td>
<td>168</td>
<td>-</td>
<td>-</td>
<td>206</td>
<td>Ω</td>
</tr>
<tr>
<td>Leakage inductance $\Delta L$</td>
<td>2.9</td>
<td>-</td>
<td>-</td>
<td>3.5</td>
<td>mH</td>
</tr>
<tr>
<td>Shunt inductance $L_p^{(4)}$</td>
<td>10mV 200Hz</td>
<td>1.1</td>
<td>-</td>
<td>3.2</td>
<td>H</td>
</tr>
<tr>
<td>Shunt loss $R_p^{(4)}$</td>
<td>10mV 200Hz</td>
<td>3.5</td>
<td>-</td>
<td>10</td>
<td>kΩ</td>
</tr>
</tbody>
</table>

**Notes**

1. Third harmonic typically exceeds other harmonics by 20dB.
2. Components are 100% tested at 6.5 kVDC.
3. Caution: do not pass DC through windings. Telephone line current, etc. must be diverted using choke or semiconductor line hold circuit.
4. At signal levels greater than 100mV, $L_p$ will increase and $R_p$ will decrease slightly but the effect is usually favourable to the return loss characteristic.
MATCHING RECOMMENDATIONS

600Ω MATCH

To extend matching and frequency response beyond 30kHz add 4.7nF between pins 1 and 3, and 4.7nF between pins 4 and 6.

CONSTRUCTION

Dimensions shown are in millimetres (inches).

Dimensions shown are in millimetres (inches). Geometric centres of outline and pad grid coincide within a tolerance circle of 0.3mmØ. Windings may be used interchangeably as primary or secondary.
SAFETY

Manufactured from materials conforming to flammability requirements of UL94V-0.
Distance through reinforced insulation 0.4mm minimum.
Creepage and clearances in circuit are 7mm minimum where PCB pads do not exceed 3mmØ.
Construction complies with IEC 60950-1, EN 60950-1 and UL 60950-1, reinforced insulation, 250Vrms maximum working voltage.

CERTIFICATION

Certified by BSI to IEC 60950 Third Edition (1999) (IEC CB Test Certificate No. GB592W) sub-clauses 1.5, 1.5.1, 1.5.2, 2.9, 2.9.1, 2.9.2, 2.9.3, 2.9.4, 2.9.5, 2.10, 2.10.1, 2.10.2, 2.10.3, 2.10.3.1, 2.10.3.2, 2.10.4, 2.10.5, 2.10.5.1, 2.10.7, 2.10.8, 4.7, 4.7.3, 4.7.3.1, 4.7.3.4, (Flammability Class V-0) 5.2, 5.2.1, and 5.2.2 for a maximum working voltage of 250Vrms, nominal mains supply voltage not exceeding 250Vrms and a maximum operating temperature of +85°C in Pollution Degree 2 environment, 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.

ORDERING CODE

P3188

TR = Tape and Reel
(Blank) = Bulk in tubes.

Carrier tape width 24mm, 500 parts per 13” reel.

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British Patent No. 2283195
US Patent No. 5879598
European Patent No. 0725719