Isolation Power Transformers
Toroid Platform SMD PH9384.XXXNL and PM2185.XXXNL

Push Pull Converter Transformer
4KVrms Isolation (550Vrms Continuous)
Sidecar Package
UL Approved
Patented: US Pat 9,646,755

Electrical Specifications @ 25°C - Operating Temperature -40°C to +125°C

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Commercial</th>
<th>Automotive</th>
<th>Inductance (1-3) (μH ±35%)</th>
<th>Leakage Inductance (1-3) with (4-6) shorted (μH MAX)</th>
<th>Capacitance (1, 2, 3) to (4, 5, 6) (pF MAX)</th>
<th>DCR (1-3) (Ω MAX)</th>
<th>DCR (4-6) (Ω MAX)</th>
<th>MAX (1-3) (Vrms)</th>
<th>Turns Ratio (1.5:6.4)</th>
<th>Isolated Voltage (Vrms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH9384.011NL</td>
<td>PM2185.011NL</td>
<td>538</td>
<td>0.8</td>
<td>20</td>
<td>0.30</td>
<td>0.40</td>
<td>24</td>
<td>1CT : 1CT</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>PH9384.012NL</td>
<td>PM2185.012NL</td>
<td>538</td>
<td>0.6</td>
<td>30</td>
<td>0.33</td>
<td>0.65</td>
<td>24</td>
<td>1CT : 2CT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH9384.021NL</td>
<td>PM2185.021NL</td>
<td>680</td>
<td>0.6</td>
<td>15</td>
<td>0.30</td>
<td>0.25</td>
<td>24</td>
<td>2CT : 1CT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH9384.034NL</td>
<td>PM2185.034NL</td>
<td>680</td>
<td>0.7</td>
<td>30</td>
<td>0.35</td>
<td>0.52</td>
<td>27</td>
<td>3CT : 4CT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH9384.035NL</td>
<td>PM2185.035NL</td>
<td>680</td>
<td>0.7</td>
<td>30</td>
<td>0.35</td>
<td>0.65</td>
<td>27</td>
<td>3CT : 5CT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH9384.038NL</td>
<td>PM2185.038NL</td>
<td>538</td>
<td>0.8</td>
<td>20</td>
<td>0.30</td>
<td>0.30</td>
<td>24</td>
<td>4CT : 3CT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH9384.043NL</td>
<td>PM2185.043NL</td>
<td>538</td>
<td>2.0</td>
<td>15</td>
<td>0.30</td>
<td>0.22</td>
<td>24</td>
<td>8CT : 3CT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH9384.089NL</td>
<td>PM2185.089NL</td>
<td>538</td>
<td>0.6</td>
<td>30</td>
<td>0.30</td>
<td>0.42</td>
<td>24</td>
<td>8CT : 9CT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. The ET Max is calculated to limit the core loss and temperature rise at 200KHz based on a bipolar flux swing of 130mT Peak.
2. For Push-Pull topology, where the voltage is applied across half of the primary winding turns, the ET needs to be derated by 50% for the same flux swing.
3. The applied ET may need to be further derated for higher frequencies based on the temperature rise which results from the core and copper losses.
   A. To calculate total copper loss (W), use the following formula:
      Copper Loss (W) = Irms_Primary * DCR_Primary + Irms_Secondary * DCR_Secondary
   B. To calculate total core loss (W), use the following formula:
      Core Loss (W) = 2.72E-12 * (Frequency in kHz)² * (130 * [ET/ET Max])²
      Where ET is the applied Volt Second, ET Max is the rated Volt Second for 130mT flux swing.
4. The AEC-Q200 temperature and humidity operational life testing was completed using a dielectric strength test of 4000Vdc.
5. Optional Tape & Reel packing can be ordered by adding a “T” suffix to the part number (i.e. PH9384.012NL becomes PH9384.012NL_T). Pulse complies to industry standard tape and reel specification EIA481.
6. The “NL” suffix indicates an RoHS-compliant part number.
7. The PM2185.XXXNL part numbers are AEC-Q200 and IATF16949 certified. The mechanical dimensions are 100% tested in production but do not necessarily meet a product capability index (Cpk) >1.33 and therefore may not strictly conform to PPAP.

Schematic

PH9384.XXXNL and PM2185.XXXNL

Mechanical

Dimensions: mm

Weight .......... 0.85 grams
Tape & Reel .......... 400/reel
Tray ................. 55/tray

Unless otherwise specified, all tolerances are: ±0.25
PH9384NL is a series of high isolation power supply transformer drivers. Intended to operate in a fixed duty cycle Push Pull topology, it is a part of a low cost solution for delivering lower power (up to 3W) from a low voltage source. A typical implementation would be an isolated RS-485/RS-232 power supply driver circuit, the design is compatible with the MAXIM™ MAX233 IC.

A schematic diagram for the Push Pull converter topology is given below.

For a fixed 50% duty cycle mode of operation, the output voltage is simply determined by the input voltage and turns ratio. So, with the available turns ratios, a variety of output voltages can be selected. PH9384.034NL has been certified by UL to comply with UL60950-1 2 edition with reinforced insulation for a working voltage up to 300Vac. 7mm creepage and 3000Vrms isolation voltage is guaranteed to meet this requirement. The 4000Vrms Isolation (550Vrms continuous) capability is in excess of this and applies to applications where just function insulation/galvanic insulation are required. The remainder of the PH9384.XXXNL series was not included in the UL certification but are fully complaint with the requirements for reinforced insulation.

MAXIM is a registered trademark of Maxim Integrated Products.

For More Information

Pulse Worldwide
Headquarters
15255 Innovation Drive Ste 100
San Diego, CA 92128
U.S.A.

Pulse Europe
Pulse Electronics GmbH
Am Rottland 12
58540 Meinerzhagen
Germany

Pulse China Headquarters
Pulse Electronics (ShenZhen) CO., LTD
D708, Shenzhen Academy of Aerospace Technology,
The 10th Keji South Road,
Nanshan District, Shenzhen,
P.R. China 518057

Pulse North China
Room 2704/2705
Super Ocean Finance Ctr.
2067 Yan An Road West
Shanghai 200336
China

Pulse South Asia
3 Fraser Street
0428 DUO Tower
Singapore 189352

Pulse North Asia
1F., No.111 Xiuyuan Rd
Zhongli City
Taoyuan City 32057
Taiwan (R.O.C)

Tel: 858 674 8100
Fax: 858 674 8262

Tel: 49 2354 777 100
Fax: 49 2354 777 168

Tel: 86 755 33966678
Fax: 86 755 33966700

Tel: 86 21 62787060
Fax: 86 262786973

Tel: 65 6287 8998
Fax: 65 6280 0080

Tel: 886 3 4356768
Fax: 886 3 4356820

Performance warranty of products offered on this data sheet is limited to the parameters specified. Data is subject to change without notice. Other brand and product names mentioned herein may be trademarks or registered trademarks of their respective owners. © Copyright, 2020. Pulse Electronics, Inc. All rights reserved.

power.pulseelectronics.com P775. M (01/20) http://www.power.pulseelectronics.com/contact