

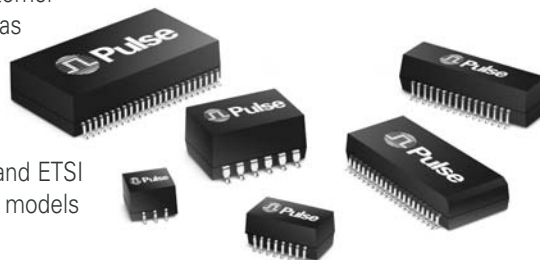
# TELECOMMUNICATIONS PRODUCTS



Pulse is a leading provider of magnetics for telecom infrastructure equipment, customer premises equipment, audio interface applications, and emerging applications such as VoIP. Our broad portfolio of transformers and integrated transformer modules support T1/E1/ISDN-PRI, T3/E3/STS-1, ISDN-S, ISDN-U, Digital Audio, and DDS.

Package options include surface mount, through hole, single, dual, quad and octal covering standard and extended temperature ranges. Many parts meet ANSI, ITU and ETSI requirements, and many are recognized by UL, TUV, Austel and/or CSA. Numerous models incorporate our patented "Interlock Base" construction, ensuring high reliability.

Please see our "Telecom IC Cross Reference" section that begins on page 18.



## TRANSFORMERS

### T1/E1/CEPT/ISDN-Pri—SINGLE, DUAL

| Part Number | RoHS-6 Part Number | Turns Ratio | Package L/W/H (in.)* | Data Sheet |
|-------------|--------------------|-------------|----------------------|------------|
|-------------|--------------------|-------------|----------------------|------------|

#### SINGLE TRANSFORMERS

##### 1.5 kV Isolation, Standard Temperature Range, THT

|          |            |               |                    |      |
|----------|------------|---------------|--------------------|------|
| PE-64931 | PE-64931NL | 1:1:1 (1:2CS) | .350 / .500 / .250 | T608 |
| PE-64933 | PE-64933NL | 1CT:3CT       | .350 / .500 / .250 | T608 |
| PE-64934 | PE-64934NL | 1:1           | .350 / .500 / .250 | T608 |
| PE-64936 | PE-64936NL | 1CT:1         | .350 / .500 / .250 | T608 |
| PE-64937 | PE-64937NL | 1:1.36        | .350 / .500 / .250 | T608 |
| PE-64940 | PE-64940NL | 1:1:1.58      | .350 / .500 / .250 | T608 |
| PE-64941 | PE-64941NL | 1:1:2         | .350 / .500 / .250 | T608 |
| PE-64942 | PE-64942NL | 1:1:2.62      | .350 / .500 / .250 | T608 |
| PE-64943 | PE-64943NL | 1CT:2CT       | .350 / .500 / .250 | T608 |
| PE-65351 | PE-65351NL | 1:2CT         | .350 / .500 / .250 | T608 |
| PE-65363 | PE-65363NL | 1:4CT         | .350 / .500 / .250 | T608 |
| PE-65379 | PE-65379NL | 1:1.14CT      | .350 / .500 / .250 | T608 |
| PE-65388 | PE-65388NL | 1:1.15CT      | .350 / .500 / .250 | T608 |
| PE-65389 | PE-65389NL | 1:1:1.266     | .350 / .500 / .250 | T608 |
| PE-65415 | PE-65415NL | 1CT:2CT       | .350 / .500 / .250 | T608 |
| PE-65558 | PE-65558NL | 1:2.3CT       | .350 / .500 / .250 | T608 |
| PE-65586 | PE-65586NL | 1:1.36CT      | .350 / .500 / .250 | T608 |
| PE-65755 | PE-65755NL | 1CT:1CT       | .350 / .500 / .250 | T608 |
| PE-68644 | PE-68644NL | 1CT:1         | .350 / .500 / .250 | T608 |
| PE-68645 | PE-68645NL | 1:1.36CT      | .350 / .500 / .250 | T608 |
| T1054    | T1054NL    | 1:1.5CT       | .350 / .500 / .250 | T608 |
| T1249    | T1249NL    | 1:1.26CT      | .350 / .500 / .250 | T608 |

##### 1.5 kV Isolation, Extended Temperature Range, THT

|          |            |           |                    |      |
|----------|------------|-----------|--------------------|------|
| PE-68664 | PE-68664NL | 1:1/1.26  | .350 / .500 / .250 | T608 |
| PE-65340 | PE-65340NL | 1:1.36    | .350 / .500 / .250 | T608 |
| PE-65770 | PE-65770NL | 1:1.15CT  | .350 / .500 / .250 | T608 |
| PE-65771 | PE-65771NL | 1CT:2CT   | .350 / .500 / .250 | T608 |
| PE-65778 | PE-65778NL | 1CT:1CT   | .350 / .500 / .250 | T608 |
| PE-68600 | PE-68600NL | 1CT:3CT   | .350 / .500 / .250 | T608 |
| TX1252   | TX1252NL   | 1CT:1     | .350 / .500 / .250 | T608 |
| T1229    | T1229NL    | 1:1.583CT | .350 / .500 / .250 | T659 |

##### 1.5 kV Isolation, Extended Temperature Range, SMT

|        |   |            |                    |      |
|--------|---|------------|--------------------|------|
| TX1281 | — | 1CT:1      | .220 / .305 / .200 | T669 |
| TX1282 | — | 1.14CT:1   | .220 / .305 / .200 | T669 |
| TX1283 | — | 1.35CT:1   | .220 / .305 / .200 | T669 |
| TX1284 | — | 1.26CT:1   | .220 / .305 / .200 | T669 |
| TX1491 | — | 1CT:1      | .220 / .305 / .200 | T669 |
| TX1492 | — | 2CT:1      | .220 / .305 / .200 | T669 |
| TX1314 | — | 1:1/1.26   | .300 / .390 / .250 | T678 |
| TX1315 | — | 1CT:1CT    | .300 / .390 / .250 | T678 |
| TX1320 | — | 1CT:1.36CT | .300 / .390 / .250 | T678 |

##### 3.0 kV – Reinforced Insulation per IEC 950, THT

|          |            |          |                    |      |
|----------|------------|----------|--------------------|------|
| PE-65830 | PE-65830NL | 1:1:1.58 | .558 / .558 / .400 | T608 |
| PE-65831 | PE-65831NL | 1:1:2    | .558 / .558 / .400 | T608 |

| Part Number | RoHS-6 Part Number | Turns Ratio | Package L/W/H (in.)* | Data Sheet |
|-------------|--------------------|-------------|----------------------|------------|
|-------------|--------------------|-------------|----------------------|------------|

#### 3.0 kV – Reinforced Insulation per IEC 950, THT (continued)

|                       |            |             |                    |      |
|-----------------------|------------|-------------|--------------------|------|
| PE-65832              | PE-65832NL | 1:1.36CT    | .558 / .558 / .400 | T608 |
| PE-65833              | PE-65833NL | 1CT:2CT     | .558 / .558 / .400 | T608 |
| PE-65834              | PE-65834NL | 1:1         | .558 / .558 / .400 | T608 |
| PE-65835 <sup>1</sup> | PE-65835NL | 1CT:2CT     | .558 / .558 / .400 | T608 |
| PE-65836              | PE-65836NL | 1CT:3CT:1   | .558 / .558 / .400 | T608 |
| PE-65837              | PE-65837NL | 1:1.08:1.36 | .558 / .558 / .400 | T608 |
| PE-65838              | PE-65838NL | 1:1.14      | .558 / .558 / .400 | T608 |
| PE-65839              | PE-65839NL | 1:1:1.266   | .558 / .558 / .400 | T608 |
| PE-68646              | PE-68646NL | 1:1.58:2    | .558 / .558 / .400 | T608 |
| PE-68788              | PE-68788NL | 1CT:1.41CT  | .558 / .558 / .400 | T608 |

#### DUAL TRANSFORMERS

##### 1.5 kV Isolation, Extended Temperature Range, THT

|          |             |                        |                     |      |
|----------|-------------|------------------------|---------------------|------|
| PE-68618 | PE-686 18NL | 1CT:1CT & 1CT:3CT:0.25 | 1.000 / .390 / .290 | T608 |
| PE-64950 | PE-64950NL  | 1CT:1CT & 1CT:3CT:1    | 1.000 / .390 / .290 | T608 |
| PE-65567 | PE-65567NL  | 1:1.15CT & 1:2CT       | .800 / .390 / .290  | T608 |
| PE-65568 | PE-65568NL  | 1:1:1.266 & 1:2CT      | .800 / .390 / .290  | T608 |
| PE-65774 | PE-65774NL  | 1CT:2CT & 1:1.36CT     | .800 / .390 / .290  | T608 |

##### 1.5 kV Isolation, Standard Temperature Range, THT

|          |            |                   |                    |      |
|----------|------------|-------------------|--------------------|------|
| PE-64951 | PE-64951NL | 1:2CT & 1:2CT     | .800 / .390 / .250 | T608 |
| PE-64952 | PE-64952NL | 1:2CT & 1:1.36CT  | .800 / .390 / .250 | T608 |
| PE-64953 | PE-64953NL | 1:2CT & 1:2CT     | .800 / .390 / .250 | T608 |
| PE-64954 | PE-64954NL | 1CT:2CT & 1:1     | .800 / .390 / .250 | T608 |
| PE-64955 | PE-64955NL | 1.58:2CT & 1.58:1 | .800 / .390 / .250 | T608 |
| PE-64956 | PE-64956NL | 2:2CT & 2:1       | .800 / .390 / .250 | T608 |
| PE-64957 | PE-64957NL | 2.62:2CT & 2.62:1 | .800 / .390 / .250 | T608 |
| PE-65565 | PE-65565NL | 1:1.15CT & 1:2CT  | .800 / .390 / .290 | T608 |
| PE-65566 | PE-65566NL | 1:1:1.266 & 1:2CT | .800 / .390 / .290 | T608 |

##### 1.5 kV Isolation, Standard Temperature Range, BH Package, SMT

|          |            |                          |                    |      |
|----------|------------|--------------------------|--------------------|------|
| T1136    | T1136NL    | 1CT:1CT & 1CT:1.36CT     | .505 / .375 / .245 | T608 |
| T1022    | T1022NL    | 1CT:1CT & 1CT:1.5CT      | .505 / .375 / .245 | T608 |
| T1190    | T1190NL    | 1CT:1.36CT & 1CT:1CT     | .505 / .375 / .245 | T654 |
| PE-65861 | PE-65861NL | 1CT:2CT & 1CT:2CT        | .505 / .375 / .245 | T608 |
| PE-65862 | PE-65862NL | 1CT:2CT & 1:1.36CT       | .505 / .375 / .245 | T608 |
| PE-65865 | PE-65865NL | 1:1.15CT & 1CT:2CT       | .505 / .375 / .245 | T608 |
| PE-65866 | PE-65866NL | 1:1/1.26 & 1CT:2CT       | .505 / .375 / .245 | T608 |
| PE-65870 | PE-65870NL | 1CT:1.15CT & 1CT:1.15CT  | .505 / .375 / .245 | T608 |
| PE-68678 | PE-68678NL | 1CT:1CT & 1CT:2CT        | .505 / .375 / .245 | T608 |
| PE-68786 | PE-68786NL | 1CT:1.41CT & 1CT:1.41CT  | .505 / .375 / .245 | T608 |
| T1023    | T1023NL    | 1CT:1.41CT & 1CT:1.41CT  | .505 / .375 / .245 | T608 |
| T1137    | T1137NL    | 1CT:2.42CT & 1CT: 2.42CT | .505 / .375 / .245 | T651 |
| T1021    | T1021NL    | 2CT:1/1.26 & 2CT:1/1.26  | .505 / .375 / .245 | T637 |
| T1075    | T1075NL    | 2CS:1.57/2 & 2CS:1.57/2  | .505 / .375 / .245 | T637 |
| T1122    | T1122NL    | 1CT:2CT & 1CT:2.3CT      | .505 / .375 / .245 | T608 |
| T1121    | T1121NL    | 1CT:1.5CT & 1CT:1.5CT    | .505 / .375 / .245 | T608 |
| T1286    | T1286NL    | 1CT:2.4CT & 1CT: 2.4CT   | .505 / .375 / .245 | T608 |

1. To make a 1CT:1 ratio from a 1CT:2CT ratio, use only one-half the 2CT winding.

\*L/W/H is measured on surface mount parts tip to tip (height includes wash area).

SMT - Surface Mount Package THT - Through Hole Package

## TELECOMMUNICATIONS PRODUCTS



## TRANSFORMERS, TRANSFORMER/CHOKE INTERFACE MODULES

T1/E1/CEPT/ISDN-Pri—SINGLE, DUAL, Quad

| Part Number  | RoHS-6 Part Number | Turns Ratio             | Package L/W/H (in.)* | Data Sheet | Part Number   | RoHS-6 Part Number | Turns Ratio             | Package L/W/H (in.)* | Data Sheet |
|--|--------------------|-------------------------|----------------------|------------|---|--------------------|-------------------------|----------------------|------------|
| <b>DUAL TRANSFORMERS (continued)</b>                                   |                    |                         |                      |            | <b>3.0 kV Isolation – Standard Temperature Range, SMT (continued)</b> |                    |                         |                      |            |
| <b>1.5 kV Isolation, Extended Temperature Range, BH Package, SMT</b>   |                    |                         |                      |            |   |                    |                         |                      |            |
| T1090  | T1090NL            | 1CT:2CT & 1CT:2CT       | .505 / .375 / .245   | T608       | T1044   | —                  | 1CT:2CT & 1CT:1.36CT    | .950 / .745 / .395   | T617       |
| T1091  | T1091NL            | 1CT:2CT & 1:1.36CT      | .505 / .375 / .245   | T608       | T1045   | —                  | 1CT:2CT & 1CT:2CT       | .950 / .745 / .395   | T617       |
| T1076  | T1076NL            | 1:1.15CT & 1CT:2CT      | .505 / .375 / .245   | T608       | T1047   | —                  | 1CT:2.3CT & 1CT:2CT     | .950 / .745 / .395   | T617       |
| T1092  | T1092NL            | 1:1/1.26 & 1CT:2CT      | .505 / .375 / .245   | T608       | T1049   | —                  | 1CT:1/1.26 & 1CT:2CT    | .950 / .745 / .395   | T617       |
| T1093  | T1093NL            | 1CT:1.15CT & 1CT:1.15CT | .505 / .375 / .245   | T608       | T1082   | —                  | 1CT:2.42CT & 1CT:2.42CT | .950 / .745 / .395   | T617       |
| T1077  | T1077NL            | 1CT:1CT & 1CT:1.5CT     | .505 / .375 / .245   | T608       | T1308   | —                  | 1CT:2.4CT & 1CT:1CT     | .675 / .600 / .340   | T666       |
| T1094  | T1094NL            | 1CT:1CT & 1CT:2CT       | .505 / .375 / .245   | T608       | <b>DUAL TRANSFORMER/CHOKE INTERFACE MODULES</b>                       |                    |                         |                      |            |
| T1144  | T1144NL            | 1CT:1CT & 1CT:2.4CT     | .505 / .375 / .245   | T608       | <b>1.5 kV Isolation, Extended Temperature Range, SMT</b>              |                    |                         |                      |            |
| T1095  | T1095NL            | 1CT:1.41CT & 1CT:1.41CT | .505 / .375 / .245   | T608       | T1207   | T1207NL            | 1CT:2CT & 1CT:2CT       | .675 / .600 / .340   | T660       |
| T1096  | T1096NL            | 1CT:1.41CT & 1CT:1.41CT | .505 / .375 / .245   | T608       | T1208   | T1208NL            | 1CT:2CT & 1CT:1.36CT    | .675 / .600 / .340   | T660       |
| T1097  | T1097NL            | 1CT:1CT & 1CT:1.67CT    | .505 / .375 / .245   | T608       | T1209   | T1209NL            | 1CT:1.15CT & 1CT:2CT    | .675 / .600 / .340   | T660       |
| T1146  | T1146NL            | 1:2/2.4 & 1:0.79/1      | .505 / .375 / .245   | T608       | T1210   | T1210NL            | 1CT:1.26CT & 1CT:2CT    | .675 / .600 / .340   | T660       |
| TX1088   | TX1088NL           | 1CT:2CT & 1CT:2.42CT    | .505 / .375 / .245   | T608       | T1211   | T1211NL            | 1CT:1.15CT & 1CT:1.15CT | .675 / .600 / .340   | T660       |
| TX1089   | TX1089NL           | 1CT:1CT & 1CT:1CT       | .505 / .375 / .245   | T608       | T1212   | T1212NL            | 1CT:1CT & 1CT:2CT       | .675 / .600 / .340   | T660       |
| TX1099   | TX1099NL           | 1CT:1:0.8 & 1CT:1:0.8   | .505 / .375 / .245   | T608       | T1213   | T1213NL            | 1CT:1.15CT & 1CT:1CT    | .675 / .600 / .340   | T660       |
| TX1287   | TX1287NL           | 1CT:2.42CT & 1CT:2.42CT | .505 / .375 / .245   | T608       | T1214   | T1214NL            | 1CT:1.36CT & 1CT:1.36CT | .675 / .600 / .340   | T660       |
| TX1317   | TX1317NL           | 1:2CT & 1:2CS           | .505 / .375 / .245   | T608       | T1215   | T1215NL            | 1CT:1.41CT & 1CT:1.41CT | .675 / .600 / .340   | T660       |
| TX1186   | TX1186NL           | 1CT:1.58:2 & 1:1.65:2   | .505 / .375 / .245   | T608       | T1216   | T1216NL            | 1CT:2.3CT & 1CT:2CT     | .675 / .600 / .340   | T660       |
| TX1187   | TX1187NL           | 1CT:2CT & 1:1           | .505 / .375 / .245   | T608       | T1217   | T1217NL            | 1CT:2.42CT & 1CT:2.42CT | .675 / .600 / .340   | T660       |
| TX1188   | TX1188NL           | 1CT:2CT & 1CT:2CT       | .505 / .375 / .245   | T608       | T1218   | T1218NL            | 1CT:1CT & 1CT:1.36CT    | .675 / .600 / .340   | T660       |
| TX1189   | TX1189NL           | 1:1.36CT & 1:2CT        | .505 / .375 / .245   | T608       | T1219   | T1219NL            | 1CT:2.4CT & 1CT:1CT     | .675 / .600 / .340   | T660       |
| TX1467   | TX1467NL           | 1CT:1:1 & 1CT:1:1       | .505 / .375 / .245   | T608       | T1220   | T1220NL            | 1CT:1CT & 1CT:1CT       | .675 / .600 / .340   | T660       |
| <b>1.5 kV Isolation, Standard Temperature Range, ANTE Package, SMT</b> |                    |                         |                      |            | <b>QUAD TRANSFORMER/CHOKE INTERFACE MODULES</b>                       |                    |                         |                      |            |
| T1131  | T1131NL            | 1CT:1 & 1:1.36CT        | .675 / .600 / .340   | T608       | <b>1.5 kV Isolation, Extended Temperature Range, SMT</b>              |                    |                         |                      |            |
| PE-68861   | PE-68861NL         | 1CT:2CT & 1CT:2CT       | .675 / .600 / .340   | T608       | T1176   | T1176NL            | 1CT:2.4CT & 1CT:1CT     | .690 / .630 / .225   | T662       |
| PE-68862   | PE-68862NL         | 1CT:2CT & 1:1.36CT      | .675 / .600 / .340   | T608       | TX1192  | TX1192NL           | 1CT:2.42CT & 1CT:2.42CT | .690 / .630 / .225   | T662       |
| PE-68863   | PE-68863NL         | 1:2CT & 1:1.14CT        | .675 / .600 / .340   | T608       | TX1193  | TX1193NL           | 1CT:2CT & 1CT:1CT       | .690 / .630 / .225   | T662       |
| PE-68864   | PE-68864NL         | 1CT:2CT & 1:1           | .675 / .600 / .340   | T608       | TX1194  | TX1194NL           | 1CT:1.15CT & 1CT:1.15CT | .690 / .630 / .225   | T662       |
| PE-68865   | PE-68865NL         | 1:1.15CT & 1CT:2CT      | .675 / .600 / .340   | T608       | TX1195  | TX1195NL           | 1CT:1.41CT & 1CT:1.41CT | .690 / .630 / .225   | T662       |
| PE-68866   | PE-68866NL         | 1:1/1.26 & 1:2CT        | .675 / .600 / .340   | T608       | TX1196  | TX1196NL           | 1CT:2CT & 1CT:2CT       | .690 / .630 / .225   | T662       |
| PE-68869   | PE-68869NL         | 1CT:2CT & 1:1.08CT      | .675 / .600 / .340   | T608       | TX1197  | TX1197NL           | 1CT:2CT & 1CT:2CT       | .690 / .630 / .225   | T662       |
| PE-68836   | PE-68836NL         | 1:1/1.26 & 1:1/1.26     | .675 / .600 / .340   | T608       | TX1198  | TX1198NL           | 1CT:2.3CT & 1CT:1CT     | .690 / .630 / .225   | T662       |
| <b>1.5 kV Isolation, Extended Temperature Range, ANTE Package, SMT</b> |                    |                         |                      |            | <b>QUAD TRANSFORMERS (four transformers per package)</b>              |                    |                         |                      |            |
| PE-68822   | PE-68822NL         | 1CT:2CT & 1:1.36CT      | .675 / .600 / .340   | T608       | <b>1.5 kV Isolation, Extended Temperature Range, SMT</b>              |                    |                         |                      |            |
| PE-68825   | PE-68825NL         | 1:1.15CT & 1CT:2CT      | .675 / .600 / .340   | T608       | TX1321  | TX1321NL           | 1CT:2.4CT & 1CT:1CT     | .690 / .630 / .225   | T662       |
| PE-68826   | PE-68826NL         | 1:1/1.26 & 1:2CT        | .675 / .600 / .340   | T608       | TX1322  | TX1322NL           | 1CT:2.42CT & 1CT:2.42CT | .690 / .630 / .225   | T662       |
| PE-68827   | PE-68827NL         | 1:1CT & 2:1             | .675 / .600 / .340   | T608       | TX1323  | TX1323NL           | 1CT:2CT & 1CT:1CT       | .690 / .630 / .225   | T662       |
| PE-68828   | PE-68828NL         | 1CT:1CT & 1CT:1CT       | .675 / .600 / .340   | T608       | TX1324  | TX1324NL           | 1CT:1.15CT & 1CT:1.15CT | .690 / .630 / .225   | T662       |
| PE-68841   | PE-68841NL         | 1CT:2CT & 1CT:2CT       | .675 / .600 / .340   | T608       | TX1325  | TX1325NL           | 1CT:1.41CT & 1CT:1.41CT | .690 / .630 / .225   | T662       |
| PE-68874   | PE-68874NL         | 1CT:1.15CT & 1CT:1.15CT | .675 / .600 / .340   | T608       | TX1326  | TX1326NL           | 1CT:2CT & 1CT:2CT       | .690 / .630 / .225   | T662       |
| PE-68877   | PE-68877NL         | 1CT:1CT & 1CT:2CT       | .675 / .600 / .340   | T608       | TX1327  | TX1327NL           | 1CT:2CT & 1CT:2CT       | .690 / .630 / .225   | T662       |
| PE-68881   | PE-68881NL         | 1CT:2.3CT & 1CT:2CT     | .675 / .600 / .340   | T608       | TX1328  | TX1328NL           | 1CT:2.3CT & 1CT:1CT     | .690 / .630 / .225   | T662       |
| PE-68882   | PE-68882NL         | 1:1.15CT & 1CT:1CT      | .675 / .600 / .340   | T608       | TX1329  | TX1329NL           | 1CT:1.36CT & 1CT:2CT    | .690 / .630 / .225   | T662       |
| PE-68884   | PE-68884NL         | 1CT:1.36CT & 1CT:1.36CT | .675 / .600 / .340   | T608       | TX1330  | TX1330NL           | 1CT:1.36CT & 1CT:1CT    | .690 / .630 / .225   | T662       |
| PE-68887   | PE-68887NL         | 1CT:1.41CT & 1CT:1.41CT | .675 / .600 / .340   | T608       | TX1331  | TX1331NL           | 1CT:1.15CT & 1CT:2CT    | .690 / .630 / .225   | T662       |
| TX1277   | TX1277NL           | 1CT:1CT & 1CT:2CT       | .675 / .600 / .340   | T608       | <b>QUAD TRANSFORMERS (four transformers per package)</b>              |                    |                         |                      |            |
| <b>3.0 kV Isolation – Standard Temperature Range, SMT</b>              |                    |                         |                      |            | <b>1.5 kV Isolation, Standard Temperature Range, SMT</b>              |                    |                         |                      |            |
| T1030  | —                  | 1CT:1CT & 1CT:1CT       | .950 / .745 / .395   | T617       | T1001   | T1001NL            | 1:1 & 1:1.36            | 1.000 / .425 / .295  | T615       |
| T1081  | —                  | 1CT:1CT & 1CT:1.5CT     | .950 / .745 / .395   | T617       | T1005   | T1005NL            | 1:1.267 & 1:1.58        | 1.000 / .425 / .295  | T615       |
| T1031  | —                  | 1CT:1CT & 1CT:2CT       | .950 / .745 / .395   | T617       | T1006   | T1006NL            | 1:1 & 1:2CT             | 1.000 / .425 / .295  | T615       |
| T1032  | —                  | 1CT:1.15CT & 1CT:1CT    | .950 / .745 / .395   | T617       | T1007   | T1007NL            | 1:1.15                  | 1.000 / .425 / .295  | T615       |
| T1033  | —                  | 1CT:1.15CT & 1CT:1.15CT | .950 / .745 / .395   | T617       | T1008   | T1008NL            | 1:1.364 & 1:2           | 1.000 / .425 / .295  | T615       |
| T1034  | —                  | 1CT:1.15CT & 1CT:2CT    | .950 / .745 / .395   | T617       | T1009   | T1009NL            | 1:1 & 1:1.265           | 1.000 / .425 / .295  | T615       |
| T1035  | —                  | 1CS:1CS & 1CS:1.36CS    | .950 / .745 / .395   | T617       | T1010   | T1010NL            | 1:1.36CT                | 1.000 / .425 / .295  | T615       |
| T1038  | —                  | 1CT:1CT & 1CT:1.36CT    | .950 / .745 / .395   | T617       | T1016   | T1016NL            | 1:1.15 & 1:2            | 1.000 / .425 / .295  | T615       |
| T1036  | —                  | 1CT:1.36CT & 1CT:1.36CT | .950 / .745 / .395   | T617       | T1017   | T1017NL            | 1:2.3 & 1:2             | 1.000 / .425 / .295  | T615       |
| T1037  | —                  | 1CT:1.41CT & 1CT:1.41CT | .950 / .745 / .395   | T617       |   |                    |                         |                      |            |
| T1080  | —                  | 1CT:1.41CT & 1CT:1.41CT | .950 / .745 / .395   | T617       |   |                    |                         |                      |            |
| T1039  | —                  | 1CT:2CT & 1CT:1.08CT    | .950 / .745 / .395   | T617       |   |                    |                         |                      |            |
| T1043  | —                  | 1CT:2CT & 1CT:1.14CT    | .950 / .745 / .395   | T617       |   |                    |                         |                      |            |

\*L/W/H is measured on surface mount parts tip to tip (height includes wash area).

SMT - Surface Mount Package THT - Through Hole Package

# TELECOMMUNICATIONS PRODUCTS



## TRANSFORMERS, TRANSFORMER MODULES

### T1/E1/CEPT/ISDN-Pri—Octal

| Part Number | RoHS-6 Part Number | Turns Ratio TX | Turns Ratio RX | Package L/W/H (in.)* | Data Sheet |
|-------------|--------------------|----------------|----------------|----------------------|------------|
| T1063       | T1063NL            | 1:1.36         | 1:1.36CT       | 1.125 / .640 / .230  | T622       |
| T1064       | T1064NL            | 1:1.14         | 1:1.14CT       | 1.125 / .640 / .230  | T622       |
| T1065       | T1065NL            | 1:2CT          | 1:2CT          | 1.125 / .640 / .230  | T622       |
| T1066       | T1066NL            | 1:2            | 1:2CT          | 1.125 / .640 / .230  | T622       |
| T1067       | T1067NL            | 1:1.36CT       | 1:2CT          | 1.125 / .640 / .230  | T622       |
| T1068       | T1068NL            | 1:2CT          | 1:1CT          | 1.125 / .640 / .230  | T622       |
| T1069       | T1069NL            | 1CT:1.41       | 1CT:1.41       | 1.125 / .640 / .230  | T622       |
| T1070       | T1070NL            | 1:1.15         | 1:2CT          | 1.125 / .640 / .230  | T622       |
| T1071       | T1071NL            | 1:1/1.26       | 1:2CT          | 1.125 / .640 / .230  | T622       |
| T1072       | T1072NL            | 1:1.15         | 1:1.15         | 1.125 / .640 / .230  | T622       |
| T1073       | T1073NL            | 1:2            | 1:2            | 1.125 / .640 / .230  | T622       |
| T1124       | T1124NL            | 1:2CT          | 1CT:2          | 1.125 / .640 / .230  | T622       |
| T1125       | T1125NL            | 1:1.70         | 1:1.36CT       | 1.125 / .640 / .230  | T622       |
| T1129       | T1129NL            | 1:1.36CT       | 1:1CT          | 1.125 / .640 / .230  | T622       |
| T1142       | T1142NL            | 1:2.4          | 1:1            | 1.125 / .640 / .230  | T622       |
| T1145       | T1145NL            | 1:2/2.4        | 1:0.79/1       | 1.125 / .640 / .230  | T622       |
| T1180       | T1180NL            | 1:2.42         | 1:2.42         | 1.125 / .640 / .230  | T622       |
| T1181       | T1181NL            | 1:2.1CT        | 1:2.1CT        | 1.125 / .640 / .230  | T622       |
| T1182       | T1182NL            | 1:2.45CT       | 1:2.45CT       | 1.125 / .640 / .230  | T622       |
| T1078       | T1078NL            | 1:1.08         | 1.08CT:1       | 1.125 / .640 / .230  | T622       |

### 1.5 kV Isolation, Extended Temperature Range, SMT

|       |         |          |          |                     |      |
|-------|---------|----------|----------|---------------------|------|
| T1103 | T1103NL | 1:1.36   | 1:1.36CT | 1.125 / .640 / .230 | T622 |
| T1104 | T1104NL | 1:1.14   | 1:1.14CT | 1.125 / .640 / .230 | T622 |
| T1105 | T1105NL | 1:2CT    | 1:2CT    | 1.125 / .640 / .230 | T622 |
| T1106 | T1106NL | 1:2      | 1:2CT    | 1.125 / .640 / .230 | T622 |
| T1107 | T1107NL | 1:1.36CT | 1:2CT    | 1.125 / .640 / .230 | T622 |
| T1108 | T1108NL | 1:2CT    | 1:1CT    | 1.125 / .640 / .230 | T622 |
| T1109 | T1109NL | 1CT:1.41 | 1CT:1.41 | 1.125 / .640 / .230 | T622 |
| T1110 | T1110NL | 1:1.15   | 1:2CT    | 1.125 / .640 / .230 | T622 |
| T1111 | T1111NL | 1:1/1.26 | 1:2CT    | 1.125 / .640 / .230 | T622 |

### 1.5 kV Isolation, Standard Temperature Range, SMT

|        |          |          |          |                     |      |
|--------|----------|----------|----------|---------------------|------|
| T1112  | T1112NL  | 1:1.15   | 1:1.15   | 1.125 / .640 / .230 | T622 |
| T1113  | T1113NL  | 1:2      | 1:2      | 1.125 / .640 / .230 | T622 |
| T1114  | T1114NL  | 1:2CT    | 1CT:2    | 1.125 / .640 / .230 | T622 |
| T1226  | T1226NL  | 1:1.5    | 1.41:1   | 1.125 / .640 / .230 | T622 |
| T1231  | T1231NL  | 1:2.4    | 1:1      | 1.125 / .640 / .230 | T622 |
| TX1262 | TX1262NL | 1:2      | 1:2      | 1.125 / .640 / .230 | T622 |
| TX1264 | TX1264NL | 1:2CT    | 1CT:1.41 | 1.125 / .640 / .230 | T622 |
| TX1266 | TX1266NL | 1:2      | 1:1      | 1.125 / .640 / .230 | T622 |
| TX1292 | TX1292NL | 1:1.36   | 1:1      | 1.125 / .640 / .230 | T622 |
| TX1294 | TX1294NL | 1:1CT    | 1:1CT    | 1.125 / .640 / .230 | T622 |
| TX1295 | TX1295NL | 1:1.26CT | 1:1.26CT | 1.125 / .640 / .230 | T622 |
| TX1298 | TX1298NL | 1:1      | 1:1      | 1.125 / .640 / .230 | T622 |
| TX1299 | TX1299NL | 1:2.42   | 1:2.42   | 1.125 / .640 / .230 | T622 |
| TX1341 | TX1341NL | 1:2      | 1:2      | 1.000 / .425 / .295 | T671 |
| TX1342 | TX1342NL | 1:1.15   | 1:1.15   | 1.000 / .425 / .295 | T671 |
| T1343  | T1343NL  | 1:1.266  | 1:1.266  | 1.000 / .425 / .295 | T671 |
| TX1344 | TX1344NL | 1:1      | 1:2      | 1.000 / .425 / .295 | T671 |
| TX1470 | TX1470NL | 1:1.41   | 1:1.41   | 1.000 / .425 / .295 | T671 |
| TX1472 | TX1472NL | 1: 2.4   | 1:1      | 1.000 / .425 / .295 | T671 |
| TX1473 | TX1473NL | 1:2      | 1:1      | 1.000 / .425 / .295 | T671 |
| TX1474 | TX1474NL | 1:2.42   | 1:2.42   | 1.000 / .425 / .295 | T671 |
| TX1471 | TX1471NL | 1:1      | 1:1      | 1.000 / .425 / .295 | T671 |

### OCTAL TRANSFORMER/CHOKE INTERFACE MODULES

#### 1.5 kV Isolation, Extended Temperature Range, SMT

|        |          |     |     |                     |      |
|--------|----------|-----|-----|---------------------|------|
| TX1263 | TX1263NL | 1:2 | 1:2 | 1.125 / .640 / .285 | T682 |
| TX1267 | TX1267NL | 1:2 | 1:1 | 1.125 / .640 / .285 | T682 |

### SONET/SDH (STM-1/E4/CMI)

| Part Number      | Turns Ratio | Primary Inductance OCL (µH MIN) | Package L/W/H (in.) <sup>1</sup> | Data Sheet |
|------------------|-------------|---------------------------------|----------------------------------|------------|
| <b>DUAL, SMT</b> |             |                                 |                                  |            |
| A7802            | 1:1         | 42                              | .500 / .295 / .220               | A103       |
| ST6200QNL        | 1CT:1CT     | 28                              | .455 / .375 / .225               | T692       |

1. **SOIC** = 50 mil pitch leads. Length and width are MAX package dimensions. Height dimensions include the wash area.

SMT - Surface Mount Package THT - Through Hole Package

\*L/W/H is measured on surface mount parts tip to tip (height includes wash area).

### T1/E1 Protection Modules

| Part Number  | Turns Ratio | Primary Inductance OCL (µH MIN) | Package L/W/H (in.)* | Data Sheet          |      |
|--|-------------|---------------------------------|----------------------|---------------------|------|
| <b>OCTAL TRANSFORMER MODULES, 1.5 kV Isolation</b>           |             |                                 |                      |                     |      |
| <b>Extended Temperature Range, Line Side Protection, SMT</b> |             |                                 |                      |                     |      |
|  | TX          | RX                              |                      |                     |      |
| T9030  | 1CT:2       | 1CT:1                           | 1.2                  | 1.255 / .852 / .305 | T656 |
| TX9031   | 1CT:2.4     | 1:1CT                           | 1.2                  | 1.255 / .852 / .305 | T670 |
| TX9032   | 1CT:1       | 1:1CT                           | 1.2                  | 1.255 / .852 / .305 | T680 |
| TX9033   | 1CT:1.14    | 1:1.4:1CT                       | 1.2                  | 1.255 / .852 / .305 | T680 |
| <b>IC Side Protection, SMT</b>                               |             |                                 |                      |                     |      |
| T9021  | 1:2.42      | 1:2.42                          | .6                   | 1.125 / .640 / .285 | T657 |
| TX9020   | 1:2.42      | 1:2.42                          | 1.2                  | 1.125 / .640 / .285 | T677 |
| TX9022   | 1:2.42      | 1:2.42                          | 1.2                  | 1.125 / .640 / .285 | T677 |
| TX9023   | 1:2         | 1:2                             | 1.2                  | 1.125 / .640 / .285 | T674 |
| TX9025   | 1:2CT       | 1:2                             | 1.2                  | 1.125 / .640 / .285 | T686 |
| TX9027   | 1:2         | 1:2                             | 1.2                  | 1.125 / .640 / .285 | T691 |

### T3/DS3/E3/STS-1—Single, Dual, Six Octal, Twelve

#### SINGLE TRANSFORMERS

##### THT

|          |          |     |                    |      |
|----------|----------|-----|--------------------|------|
| PE-68629 | 1:1      | 40  | .350 / .500 / .250 | T606 |
| PE-65966 | 1:1      | 40  | .300 / .280 / .250 | T606 |
| PE-65663 | 1:1      | 40  | .300 / .400 / .250 | T606 |
| PE-65969 | 1:2CT    | 19  | .300 / .280 / .250 | T606 |
| PE-65664 | 1:2CT    | 35  | .300 / .400 / .250 | T606 |
| PE-68630 | 1:2CT    | 19  | .350 / .500 / .250 | T606 |
| PE-65779 | 1:4CT    | 200 | .300 / .400 / .250 | T606 |
| PE-65856 | 1:1.73CT | 50  | .300 / .280 / .250 | T606 |

##### SMT

|          |       |    |                    |      |
|----------|-------|----|--------------------|------|
| PE-65967 | 1:1   | 40 | .300 / .390 / .250 | T606 |
| PE-65662 | 1:1   | 45 | .300 / .420 / .200 | T606 |
| PE-65968 | 1:2CT | 19 | .300 / .390 / .250 | T606 |
| PE-65661 | 1:2CT | 35 | .300 / .420 / .200 | T606 |

#### SMT, Extended Temperature Range

|       |          |     |                    |      |
|-------|----------|-----|--------------------|------|
| T3001 | 1:1      | 100 | .300 / .390 / .250 | T619 |
| T3002 | 1:2CT    | 40  | .300 / .390 / .250 | T619 |
| T3011 | 1:1      | 100 | .300 / .390 / .250 | T619 |
| T3012 | 1:2CT    | 40  | .300 / .390 / .250 | T619 |
| T3027 | 1CT:1CT  | 40  | .300 / .390 / .250 | T619 |
| T3029 | 1:1.15CT | 40  | .300 / .390 / .250 | T619 |

#### DUAL TRANSFORMERS,

##### SMT, Extended Temperature Range

|        |               |           |                    |      |
|--------|---------------|-----------|--------------------|------|
| T3020  | 1:2CT & 1:1   | 40 & 100  | .505 / .375 / .245 | T655 |
| T3021  | 1:2CT & 1:2CT | 100 & 100 | .505 / .375 / .245 | T655 |
| T3023  | 1:1 & 1:1     | 40 & 40   | .505 / .375 / .245 | T655 |
| TX3025 | 1CT:1CT & 1:1 | 100 & 100 | .505 / .375 / .245 | T655 |
| TX3026 | 1:2CT & 1:1   | 100 & 100 | .505 / .375 / .245 | T655 |

#### SIX TRANSFORMERS (Triple Port)

##### SMT, Extended Temperature Range

|        |     |     |                    |      |
|--------|-----|-----|--------------------|------|
| TX3036 | 1:1 | 100 | .537 / .510 / .226 | T672 |
|--------|-----|-----|--------------------|------|

#### OCTAL TRANSFORMERS (Quad Port)

##### SMT

|        |             |    |                     |      |
|--------|-------------|----|---------------------|------|
| TX3042 | 1:1 & 1:2CT | 40 | 1.125 / .640 / .230 | T690 |
| TX3045 | 1:1 & 1:2   | 40 | 1.000 / .425 / .295 | T663 |
| TX3047 | 1:1         | 40 | 1.000 / .425 / .295 | T663 |
| T3048  | 1:1         | 40 | 1.000 / .425 / .295 | T663 |
| T3049  | 1:2         | 19 | 1.000 / .425 / .295 | T663 |

#### TWELVE TRANSFORMERS (Six Port)

##### SMT, Extended Temperature Range

|        |     |    |                     |      |
|--------|-----|----|---------------------|------|
| TX3051 | 1:1 | 60 | 1.120 / .630 / .280 | T668 |
| TX3052 | 1:2 | 40 | 1.120 / .630 / .280 | T668 |

## TELECOMMUNICATIONS PRODUCTS



## TRANSFORMERS, TRANSFORMER MODULES

ISDN U-Interface <sup>1</sup>

| Part Number | ISDN U-Interface <sup>1</sup> |          |             | Turns Ratio | OCL Line Side (mH MIN) | Package L/W/H (in.)* | Data Sheet |
|-------------|-------------------------------|----------|-------------|-------------|------------------------|----------------------|------------|
|             | 1.5-2.0 kV                    | 2.5 kV   | 3 kV        |             |                        |                      |            |
| <b>THT</b>  |                               |          |             |             |                        |                      |            |
| PE-65575    | —                             | PE-68669 | 1.65:1      | 13.0 -18.0  | 1.100/ .750 / .430     | T603                 |            |
| PE-65578    | —                             | —        | 1.32:1      | 7.0 - 8.3   | 1.100/ .750 / .430     | T603                 |            |
| PE-65579    | —                             | —        | 2.00:1      | 25.5 - 28.5 | 1.100/ .950 / .450     | T603                 |            |
| PE-65581    | —                             | —        | 1.50:1      | 14.2-15.8   | 1.100/ .950 / .450     | T603                 |            |
| PE-65583    | PE-68631                      | —        | 1.50:1      | 25.6-28.4   | 1.100/ .950 / .450     | T603                 |            |
| PE-65584    | PE-68681                      | —        | 1.50:1      | 25.6-28.4   | 1.100/ .950 / .450     | T603                 |            |
| PE-68628    | PE-68668                      | —        | 1.25:1      | 26.5-29.5   | 1.100/ .950 / .450     | T603                 |            |
| T4008       | —                             | —        | 1.50:1      | 73.0-98.0   | 1.050/ .900/1.050      | T616                 |            |
| PT4084      | —                             | —        | 1:0.75:0.75 | 85.0        | .800/1.020/ .675       | PT4084               |            |
| PT5031      | —                             | —        | 1:1.25      | 14.5        | .800/1.020/ .675       | PT5031               |            |
| PT5062      | —                             | —        | 1:1.6CT     | 27.0        | .800/1.020/ .675       | PT5062               |            |
| PT5065      | —                             | —        | 1:1.33CT    | 27.0        | .800/1.020/ .675       | PT5065               |            |
| T4022       | —                             | —        | 1.6CS:1CT   | 8.41-2.60   | .760 / .870 / .450     | T625                 |            |

1. Echo Cancellation Hybrid units PE-36005 and PE-36005W are also available.

| Part Number | Turns Ratio | Primary Inductance OCL (mH MIN) | Package L/W/H (in.)* | Data Sheet |
|-------------|-------------|---------------------------------|----------------------|------------|
| <b>SMT</b>  |             |                                 |                      |            |
| T4001       | 1.25:1      | 26.5 - 30.0                     | .760 / .870 / .500   | T614       |
| T4002       | 1.65:1      | 15.0 - 18.0                     | .760 / .870 / .500   | T614       |
| T4004       | 1.50:1      | 25.6 - 28.4                     | .760 / .870 / .500   | T614       |
| T4006       | 1.50:1      | 14.2 - 15.8                     | .760 / .870 / .500   | T614       |
| T4031       | 1.65CS:1CT  | 13.0 - 18.0                     | .695 / .530 / .485   | T624       |
| T4032       | 1.25CS:1CT  | 11.9 - 16.1                     | .695 / .530 / .485   | T624       |
| T4033       | 1.25CS:1CT  | 26.6 - 29.4                     | .695 / .530 / .485   | T624       |
| T4043       | 2CS:1CS     | 13.5 - 16.5                     | .695 / .530 / .485   | T624       |
| T4067       | 1.32CS:1    | 7.5 - 8.3                       | .695 / .530 / .485   | T624       |

1. Echo Cancellation Hybrid units PE-36005 and PE-36005W are also available.

## ISDN S-Interface — Single, Dual

| Part Number                                  | Turns Ratio | Primary Inductance OCL (mH MIN) | Package L/W/H (in.)* | Data Sheet |
|--|-------------|---------------------------------|----------------------|------------|
| <b>SINGLE TRANSFORMERS, 1.5 kV ISOLATION</b> |             |                                 |                      |            |
| <b>PCMCIA Type 2, SMT</b>                    |             |                                 |                      |            |
| T5002  | 1:1         | 22                              | .492 / .670 / .167   | T631       |
| T5003  | 1:2         | 22                              | .492 / .670 / .167   | T631       |
| T5004  | 1:2.5       | 22                              | .492 / .670 / .167   | T631       |

## SINGLE TRANSFORMERS, 2.0 kV ISOLATION

|            |       |    |                    |      |
|------------|-------|----|--------------------|------|
| <b>THT</b> |       |    |                    |      |
| PE-64993   | 1:1   | 22 | .560 / .560 / .400 | T604 |
| PE-64994   | 1:1.8 | 22 | .560 / .560 / .400 | T604 |
| PE-64995   | 1:2   | 22 | .560 / .560 / .400 | T604 |
| PE-64996   | 1:2.5 | 22 | .560 / .560 / .400 | T604 |
| PE-64998   | 1:2.5 | 22 | .560 / .560 / .400 | T604 |
| PE-64999   | 1:2   | 22 | .560 / .560 / .400 | T604 |

## DUAL TRANSFORMERS, 2.0 kV ISOLATION

|            |               |    |                    |      |
|------------|---------------|----|--------------------|------|
| <b>THT</b> |               |    |                    |      |
| PE-65492   | 1:1 & 1:2     | 22 | .920 / .560 / .400 | T604 |
| PE-65493   | 1:1 & 1:1     | 22 | .920 / .560 / .400 | T604 |
| PE-65495   | 1:2 & 1:2     | 22 | .920 / .560 / .400 | T604 |
| PE-65498   | 1:2.5 & 1:2.5 | 22 | .920 / .560 / .400 | T604 |
| PE-65499   | 1:2 & 1:2     | 22 | .920 / .560 / .400 | T604 |

|            |                       |    |                    |        |
|------------|-----------------------|----|--------------------|--------|
| <b>SMT</b> |                       |    |                    |        |
| PE-65792   | 1:1 & 1:2             | 22 | .950 / .720 / .390 | T604   |
| PE-65793   | 1:1 & 1:1             | 22 | .950 / .720 / .390 | T604   |
| PE-65795   | 1:2 & 1:2             | 22 | .950 / .720 / .390 | T604   |
| PE-65798   | 1:2.5 & 1:2.5         | 22 | .950 / .720 / .390 | T604   |
| PE-65799   | 1:2 & 1:2             | 22 | .950 / .720 / .390 | T604   |
| ST5048     | 1CS:2.5CS & 1CS:2.5CS | 22 | .987 / .575 / .340 | ST5048 |
| ST5069     | 1CS:2CS & 1CS:2CS     | 22 | .987 / .575 / .340 | ST5069 |

## ISDN S-Interface — Single, Dual (continued)

| Part Number  | Turns Ratio   | Primary Inductance OCL (mH MIN) | Package L/W/H (in.)* | Data Sheet |
|--|---------------|---------------------------------|----------------------|------------|
| <b>DUAL TRANSFORMERS, 2.0 kV ISOLATION (continued)</b> |               |                                 |                      |            |
| <b>Low Profile, SMT</b>                                |               |                                 |                      |            |
| T5005  | 1:2.5 & 1:2.5 | 22                              | .950 / .720 / .295   | T613       |
| T5006  | 1:2 & 1:2     | 22                              | .950 / .720 / .295   | T613       |
| T5007  | 1:2 & 1:2     | 22                              | .950 / .720 / .295   | T613       |
| T5008  | 1:1 & 1:1     | 22                              | .950 / .720 / .295   | T613       |
| T5009  | 1:1 & 1:2     | 22                              | .950 / .720 / .295   | T613       |
| T5010  | 1:1.8 & 1:1.8 | 22                              | .950 / .720 / .295   | T613       |

## SINGLE TRANSFORMERS, 3.0 kV ISOLATION

|   |         |    |                    |      |
|---|---------|----|--------------------|------|
| <b>Reinforced Insulation per IEC 950, THT</b> |         |    |                    |      |
| PE-68992                                      | 1:2CT   | 22 | .750 / .750 / .500 | T604 |
| PE-68993                                      | 1:1     | 22 | .750 / .750 / .500 | T604 |
| PE-68995                                      | 1:2     | 22 | .750 / .750 / .500 | T604 |
| PE-68998                                      | 1:2.5   | 22 | .750 / .750 / .500 | T604 |
| PE-68999                                      | 1:2     | 22 | .750 / .750 / .500 | T604 |
| T5035   | 1CT:2CT | 30 | .578 / .648 / .565 | T636 |

## DUAL TRANSFORMERS, 3.0 kV ISOLATION

|            |               |    |                     |      |
|------------|---------------|----|---------------------|------|
| <b>SMT</b> |               |    |                     |      |
| T5042      | 1:2 & 1:2     | 22 | 1.092 / .726 / .430 | T638 |
| T5043      | 1:2.5 & 1:2.5 | 22 | 1.092 / .726 / .430 | T638 |

## ISDN S-Interface Modules, Transformer &amp; Choke

| Part Number | Turns Ratio           | Pri. Inductance OCL (mH MIN) | OCL (mH MIN) |                     | Package L/W/H (in.)* | Data Sheet |
|-------------|-----------------------|------------------------------|--------------|---------------------|----------------------|------------|
|             |                       |                              | Transformer  | Choke               |                      |            |
| <b>THT</b>  |                       |                              |              |                     |                      |            |
| T5011       | 1CT:1CT & 1CT:1CT     | 30                           | 4.70         | 1.150 / .420 / .590 | T632                 |            |
| T5012       | 1CT:2CT & 1CT:2CT     | 30                           | 4.70         | 1.150 / .420 / .590 | T632                 |            |
| T5013       | 1CT:2.5CT & 1CT:2.5CT | 30                           | 4.70         | 1.150 / .420 / .590 | T632                 |            |
| T5015       | 1:2CT & 1:2CT         | 30                           | 4.70         | 1.150 / .420 / .590 | T632                 |            |
| <b>SMT</b>  |                       |                              |              |                     |                      |            |
| T5034       | 1CT:2CT & 1CT:2CT     | 30                           | 4.70         | 1.170 / .660 / .320 | T635                 |            |
| T5037       | 1CT:2.5CT & 1CT:2.5CT | 30                           | 4.70         | 1.170 / .660 / .320 | T635                 |            |
| T5038       | 1CT:2CT & 1CT:2CT     | 30                           | 0.47         | 1.170 / .660 / .320 | T635                 |            |
| T5039       | 1CT:2.5CT & 1CT:2.5CT | 30                           | 0.47         | 1.170 / .660 / .320 | T635                 |            |
| ST5201      | 1CS:2CS & 1CS:2CS     | 22                           | 0.42         | .987 / .575 / .340  | ST5201               |            |
| T5049       | 1CT:1CT & 1CT:1CT     | 30                           | 4.70         | 1.170 / .660 / .320 | T635                 |            |

## Echelon® &amp; Digital Audio, Single

| Part Number        | Turns Ratio | Primary Inductance OCL (mH MIN) | Package L/W/H (in.)* | Data Sheet |
|--------------------|-------------|---------------------------------|----------------------|------------|
| <b>THT</b>         |             |                                 |                      |            |
| T6074 <sup>1</sup> | 1:1         | .225                            | .350 / .500 / .250   | T688       |
| T6075              | 1:1         | .225                            | .350 / .500 / .250   | T688       |
| PE-65948           | 1CT:1CT     | 3.5 - 6.5                       | .350 / .500 / .250   | T602       |
| PE-65612           | 1:1         | 2.5                             | .350 / .500 / .250   | T601       |
| <b>SMT</b>         |             |                                 |                      |            |
| PE-65848           | 1CS:1CS     | 3.5 - 6.5                       | .480 / .600 / .340   | T602       |
| PE-65812           | 1:1         | 2.5                             | .480 / .600 / .340   | T601       |

1. With shield

## DDS / Switched 56

|            |         |    |                    |      |
|------------|---------|----|--------------------|------|
| <b>SMT</b> |         |    |                    |      |
| T7002      | 1CT:1CT | 40 | .530 / .695 / .485 | T629 |
| T7006      | 1CT:1CT | 40 | .410 / .525 / .365 | T629 |

## Audio / Voice Band

|                          |     |      |                    |      |
|--------------------------|-----|------|--------------------|------|
| <b>SMT</b>               |     |      |                    |      |
| <b>Isolation Voltage</b> |     |      |                    |      |
| T6003                    | 1:1 | 1500 | .530 / .695 / .485 | T628 |

SMT - Surface Mount Package THT - Through Hole Package

\*L/W/H is measured on surface mount parts tip to tip (height includes wash area).

# TELECOM IC CROSS REFERENCE



## IC CROSS REFERENCE

| ISDN U-Interface                       |                         |       |                       |                    |          |          |
|--|-------------------------|-------|-----------------------|--------------------|----------|----------|
| IC Manufacturer/<br>IC Part Number     | Recommended Transformer |       |                       |                    |          |          |
|  | 1.5 kV                  |       | 2 kV                  |                    | 2.5 kV   | 3 kV     |
|  | THT                     | SMT   | THT                   | SMT                |          |          |
| <b>Alcatel (Microelectronics)</b>      |                         |       |                       |                    |          |          |
| MTC20276                               | —                       | T4043 | —                     | —                  | —        | —        |
| <b>AKM</b>                             |                         |       |                       |                    |          |          |
| AK5204                                 | T4022                   | —     | —                     | —                  | —        | —        |
| <b>Infineon Technologies (Siemens)</b> |                         |       |                       |                    |          |          |
| PEB 2091                               | PT5031                  | T4031 | PE-65575              | T4002              | —        | PE-68669 |
| PEB 8091/8191                          | —                       | T4031 | PE-65575              | T4002              | —        | PE-68669 |
| PEB 2090/20901                         | —                       | T4067 | PE-65578              | —                  | —        | —        |
| PEB 24902/11                           | —                       | T4031 | PE-65575              | T4002              | —        | PE-68669 |
| PSB 21910/11                           | —                       | T4031 | PE-65575              | T4002              | —        | PE-68669 |
| PEB 2491                               | —                       | T4032 | —                     | —                  | —        | —        |
| PEB 20901                              | —                       | T4067 | PE-65578              | —                  | —        | —        |
| PEB 2095                               | —                       | —     | —                     | —                  | —        | —        |
| PSB 2196                               | —                       | —     | —                     | —                  | —        | —        |
| <b>Lucent Technologies</b>             |                         |       |                       |                    |          |          |
| T7234                                  | PT4084                  | —     | T4008                 | —                  | —        | —        |
| <b>Motorola</b>                        |                         |       |                       |                    |          |          |
| MC145472                               | —                       | —     | PE-65579              | —                  | —        | —        |
| MC145572                               | PT5062                  | T4033 | PE-68628 <sup>1</sup> | T4001 <sup>2</sup> | PE-68668 | —        |
| <b>National Semiconductor</b>          |                         |       |                       |                    |          |          |
| TP3410                                 | PT5065                  | —     | PE-65583              | —                  | PE-68631 | —        |
|  | —                       | —     | PE-65584              | T4004              | —        | —        |
| <b>Thomson</b>                         |                         |       |                       |                    |          |          |
| SD 5411                                | —                       | —     | PE-65581              | T4006              | PE-68631 | —        |

1. **Small package** for North American applications available.  
See T618 data sheet.

2. **Suitable** for use in North America only.

| Echelon® & Digital Audio |                 |          |             |
|--------------------------|-----------------|----------|-------------|
| IC Manufacturer          | IC Part Number  | Single   |             |
|                          |                 | SMT      | THT         |
| Echelon®                 | 3120™ 1.25 Mbps | PE-65848 | PE-65948    |
|                          | 3150™ 1.25 Mbps | PE-65848 | PE-65948    |
| AKM                      | AK4101          | PE-65812 | PE-65612    |
|                          | AK4102          | PE-65812 | PE-65612    |
|                          | AK4103          | PE-65812 | PE-65612    |
| Cirrus Logic             | CS8401/2/3/4    | PE-65812 | PE-65612    |
|                          | CS8405/8415     | PE-65812 | PE-65612    |
|                          | CS8413/14/27    | PE-65812 | PE-65612    |
|                          | CS8406/8416     | —        | T6074/T6075 |
| Realtek                  | ALS300+         | PE-65812 | PE-65612    |

| DDS/Switched 56 |                |                         |
|-----------------|----------------|-------------------------|
| IC Manufacturer | IC Part Number | Recommended Transformer |
|                 |                | Dual SMT                |
| Intel           | LXT 441        | T7002                   |
| Intel           | LXT 441        | T7006                   |

| SONET/SDH (STM-1/E4/CMI) DUAL TRANSFORMERS |                      |                         |
|--|----------------------|-------------------------|
| IC Manufacturer                            | IC Part Number       | Recommended Transformer |
|  |                      | Single SMT              |
| AMCC                                       | S3015, S3016, S3031B | A7802                   |
| Intel                                      | LXT6155              | ST6200QNL               |

| ISDN S-Interface                       |                                      |            |          |                             |                                 |                      |                    |         |
|--|--------------------------------------|------------|----------|-----------------------------|---------------------------------|----------------------|--------------------|---------|
| IC Manufacturer/<br>Part Number        | Dual SMT                             | Single THT | Dual THT | Dual SMT Module<br>1.5kVRMS | THT Module w/<br>Choke 1.5kVRMS | Single THT<br>3kVRMS | Dual SMT<br>3kVRMS | PCMCIA  |
|  | TX & RX                              | TX & RX    | TX & RX  | TX & RX                     | TX & RX                         | TX & RX              | TX & RX            | TX & RX |
| <b>Alcatel (Microelectronics)</b>      |                                      |            |          |                             |                                 |                      |                    |         |
| MTC2072, MTC20172                      | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| MTC20276/77                            | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| <b>AMD</b>                             |                                      |            |          |                             |                                 |                      |                    |         |
| AM79C30/32                             | PE-65799/T5006 <sup>LP</sup>         | PE-64999   | PE-65499 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| <b>Cologne Chip Design</b>             |                                      |            |          |                             |                                 |                      |                    |         |
| HFC-SXX                                | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68999/T5035       | T5042              | T5003   |
| <b>Infineon Technologies (Siemens)</b> |                                      |            |          |                             |                                 |                      |                    |         |
| PEB2080/81/84/85/86                    | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| PSB2115/86                             | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| PSB21381/82/83/84                      | PE-65793/T5008 <sup>LP</sup> /ST5048 | PE-64993   | PE-65493 | T5049                       | T5011                           | PE-68993             | —                  | T5002   |
| PEB3018/86, PSB3186                    | PE-65793/T5008 <sup>LP</sup> /ST5048 | PE-64993   | PE-65493 | T5049                       | T5011                           | PE-68993             | —                  | T5002   |
| PEB8090/91, PEB8190/91                 | —                                    | —          | —        | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | —       |
| <b>Intel</b>                           |                                      |            |          |                             |                                 |                      |                    |         |
| 29C53                                  | PE-65795/T5010 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| <b>Lucent Technologies</b>             |                                      |            |          |                             |                                 |                      |                    |         |
| T7234, T7254                           | PE-65798/T5005 <sup>LP</sup>         | PE-64998   | PE-65498 | T5037/T5039                 | T5013                           | PE-68998             | T5043              | T5004   |
| T7250/56/59                            | PE-65798/T5005 <sup>LP</sup>         | PE-64998   | PE-65498 | T5037/T5039                 | T5013                           | PE-68998             | T5043              | T5004   |
| T7901/03                               | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| <b>Mitel</b>                           |                                      |            |          |                             |                                 |                      |                    |         |
| MT8930/31                              | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| <b>Motorola</b>                        |                                      |            |          |                             |                                 |                      |                    |         |
| MC145474/475                           | PE-65793/T5008 <sup>LP</sup> /ST5048 | PE-64993   | PE-65493 | T5049                       | T5011                           | PE-68993             | —                  | T5002   |
| MC145574                               | PE-65798/T5005 <sup>LP</sup>         | PE-64998   | PE-65498 | T5037/T5039                 | T5013                           | PE-68998             | T5043              | T5004   |
| <b>National Semiconductor</b>          |                                      |            |          |                             |                                 |                      |                    |         |
| TP3420/21                              | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| <b>SGS Thomson</b>                     |                                      |            |          |                             |                                 |                      |                    |         |
| ST5420/21                              | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |
| <b>Yamaha</b>                          |                                      |            |          |                             |                                 |                      |                    |         |
| 7405B, YTD421                          | PE-65795/T5007 <sup>LP</sup> /ST5069 | PE-64995   | PE-65495 | T5034/T5038/ST5201          | T5015/T5012                     | PE-68995/T5035       | T5042              | T5003   |

NOTE: LP = Low Profile

\*L/W/H is measured on surface mount parts tip to tip (height includes wash area).

SMT - Surface Mount Package THT - Through Hole Package

## TELECOM IC CROSS REFERENCE



## IC CROSS REFERENCE

## T3/DS3/E3/STS-1

| IC Manufacturer/<br>IC Part Number | 12 Xfmrs      | Octal       | 6 Xfmrs         | Dual SMT        | Single SMT     |          |                |          | Single THT |          | Single THT<br>3 kVRMS |          |
|------------------------------------|---------------|-------------|-----------------|-----------------|----------------|----------|----------------|----------|------------|----------|-----------------------|----------|
|                                    | Ext. Temp.    | Xfmrs       | Ext. Temp.      | Ext. Temp.      | Standard Temp. |          | Extended Temp. |          | TX         | RX       | TX                    | RX       |
|                                    | TX & RX       | TX & RX     | TX & RX         | TX & RX         | TX             | RX       | TX             | RX       |            |          |                       |          |
| <b>Exar</b>                        |               |             |                 |                 |                |          |                |          |            |          |                       |          |
| XRT75xxx                           | TX3051        | T3048       | TX3036          | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| XRT73L00/2/3/4/6/12                | TX3051        | T3048       | TX3036          | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| XRT73LC03A/04A,R12                 | TX3051        | T3048       | TX3036          | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| XRT7300/7302                       | TX3051        | T3048       | TX3036          | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| <b>Infineon Technologies</b>       |               |             |                 |                 |                |          |                |          |            |          |                       |          |
| PEB3452/3460                       | —             | —           | —               | —               | —              | —        | T3027          | T3011/01 | —          | —        | —                     | —        |
| <b>Maxim (Dallas Semi)</b>         |               |             |                 |                 |                |          |                |          |            |          |                       |          |
| DS3181/2/3/4                       | TX3052        | T3049       | —               | —               | PE-65968       | PE-65968 | T3002          | T3002    | PE-65969   | PE-65969 | PE-68630              | PE-68630 |
| DS3150/1/2/3/4                     | TX3052        | T3049       | —               | —               | PE-65968       | PE-65968 | T3002          | T3002    | PE-65969   | PE-65969 | PE-68630              | PE-68630 |
| <b>Mindspeed</b>                   |               |             |                 |                 |                |          |                |          |            |          |                       |          |
| CN28333/332/331                    | TX3051        | T3048       | TX3036          | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| M28335/M28356                      | TX3051        | T3048       | TX3036          | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| M28354/3/2                         | TX3051        | T3048       | TX3036          | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| <b>TDK Semiconductor</b>           |               |             |                 |                 |                |          |                |          |            |          |                       |          |
| 78P2342/43/44                      | TX3051/TX3052 | TX3045      | T3020 or TX3026 | PE-65968        | PE-65967       | T3002    | T3001          | PE-65969 | PE-65966   | PE-68630 | PE-68629              | —        |
| 78P2241B                           | TX3051/TX3052 | TX3045      | T3020 or TX3026 | PE-65968        | PE-65967       | T3002    | T3001          | PE-65969 | PE-65966   | PE-68630 | PE-68629              | —        |
| 78P7200/7200L                      | TX3051/TX3052 | TX3045      | T3020 or TX3026 | PE-65968        | PE-65967       | T3002    | T3001          | PE-65969 | PE-65966   | PE-68630 | PE-68629              | —        |
| 78P7203L/7204L                     | TX3051/TX3052 | TX3045      | T3020 or TX3026 | PE-65968        | PE-65967       | T3002    | T3001          | PE-65969 | PE-65966   | PE-68630 | PE-68629              | —        |
| 78P2362/2361                       | TX3051/TX3052 | TX3045      | T3020 or TX3026 | PE-65968        | PE-65967       | T3002    | T3001          | PE-65969 | PE-65966   | PE-68630 | PE-68629              | —        |
| <b>Transwitch</b>                  |               |             |                 |                 |                |          |                |          |            |          |                       |          |
| MRT TXC-02050                      | TX3051/TX3052 | TX3045      | —               | T3020 or TX3026 | PE-65968       | PE-65967 | T3002          | T3001    | PE-65969   | PE-65966 | PE-68630              | PE-68629 |
| ART TXC-02020                      | TX3051        | T3048       | —               | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| ARTE TXC-02021                     | TX3051        | T3048       | —               | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| DART TXC-2030, DS3                 | TX3051        | T3048       | —               | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| DART TXC-2030, E3                  | TX3051/TX3052 | T3049/T3048 | —               | T3020 or TX3026 | PE-65968       | PE-65967 | T3002          | T3001    | PE-65969   | PE-65966 | PE-68630              | PE-68629 |
| DS3LIM-SN, TXC20153G               | TX3051        | T3048       | —               | TX3025          | PE-65967       | PE-65967 | T3001          | T3001    | PE-65966   | PE-65966 | PE-68629              | PE-68629 |
| E3LIM TXC-20163                    | TX3051/TX3052 | T3049/T3048 | —               | T3020 or TX3026 | PE-65968       | PE-65967 | T3002          | T3001    | PE-65969   | PE-65966 | PE-68630              | PE-68629 |

\*L/W/H is measured on surface mount parts tip to tip (height includes wash area).

SMT - Surface Mount Package THT - Through Hole Package

# TELECOM IC CROSS REFERENCE



## IC CROSS REFERENCE: T1/E1/CEPT/ISDN-Pri FOR SINGLE & MULTI-PORT PORT ICs

| IC MFR.                               | IC PART NO. / COMMENT      | DUAL SMT (BH)      |          | DUAL SMT (AN) |          | DUAL SMT XFMR/CHOKE | SINGLE THT    |             |          |          |
|---------------------------------------|----------------------------|--------------------|----------|---------------|----------|---------------------|---------------|-------------|----------|----------|
|                                       |                            | STD TEMP           | EXT TEMP | STD TEMP      | EXT TEMP | EXT TEMP            | STANDARD TEMP |             |          |          |
|                                       |                            | TX & RX            | TX & RX  | TX & RX       | TX & RX  | TX & RX             | TX            | RX          |          |          |
| Cirrus Logic<br>(Crystal)             | 61577                      | T1 & E1            | PE-65861 | T1090         | PE-68861 | PE-68841            | T1207         | PE-65351    | PE-65351 |          |
|                                       | 61304A/5A/535A/574A,/75    | T1                 | PE-65865 | T1076         | PE-68865 | PE-68825            | T1209         | PE-65388    | PE-65351 |          |
|                                       | 61304A/5A/535A/574A,/75    | 75 E1              | PE-65866 | T1092         | PE-65866 | PE-68826            | T1212         | PE-65389    | PE-65351 |          |
|                                       | 61304A/5A/535A/574A,/75    | 120 E1             | PE-65866 | T1092         | PE-65866 | PE-68826            | T1210         | PE-65389    | PE-65351 |          |
|                                       | 61884                      | T1/E1/J1           | PE-65861 | TX1188        | PE-68861 | PE-68841            | T1207         | PE-65351    | PE-65351 |          |
|                                       | 61582, 61583               |                    | PE-65870 | T1093         | PE-68874 | PE-68874            | T1211         | PE-65388    | PE-65388 |          |
|                                       | 61310, 61581               |                    | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65351    | PE-64936 |          |
|                                       | 61310, 61581               | Host               | T1022    | T1077         | T1022    | —                   | —             | PE-65351    | PE-65351 |          |
|                                       | 61880, 61881               |                    | PE-65865 | T1076         | PE-68865 | PE-68825            | T1209         | PE-65388    | PE-65351 |          |
|                                       | 61584/84A                  | IQ3                | PE-65861 | T1090         | PE-68861 | PE-68841            | T1207         | PE-65351    | PE-65351 |          |
|                                       | 61584/82/83/A              | IQ5                | PE-65870 | T1093         | PE-68874 | PE-68874            | T1211         | PE-65388    | PE-65388 |          |
|                                       | Exar                       | XRT5683A, XRT59L91 |          | PE-65861      | T1090    | PE-68861            | PE-68841      | T1207       | PE-65415 | PE-65415 |
|                                       |                            | XRT5894/5897/5997  |          | PE-65861      | T1090    | PE-65861            | PE-68841      | T1207       | PE-65415 | PE-65415 |
|                                       |                            | XRTT5793/94        |          | PE-65866      | T1092    | PE-68866            | PE-68826      | T1220       | PE-65389 | PE-64934 |
| XRT81L2782L24,82D20                   |                            |                    | PE-65861 | T1090         | PE-68861 | PE-68841            | T1207         | PE-65415    | PE-65415 |          |
| XRT83L30/4/8/314,86L38                |                            |                    | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65415    | PE-64934 |          |
| XRT83SL30/4/8/314                     |                            |                    | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65415    | PE-64934 |          |
| XRT86L30/32/34/38                     |                            |                    | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65415    | PE-64934 |          |
| T5684,XRT7288,82D20                   |                            | PE-65862           | T1091    | PE-68862      | PE-68822 | T1208               | PE-64937      | PE-65351    |          |          |
| IDT                                   | 82V2048, 82V2058           |                    | TX1188   | TX1188        | PE-68861 | PE-68841            | T1207         | PE-65415    | PE-65415 |          |
|                                       | 82V2044/48/48L/54/58       |                    | TX1188   | TX1188        | PE-68861 | PE-68841            | T1207         | PE-65415    | PE-65415 |          |
|                                       | 82V2041E/2E/4E/8E          |                    | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65415    | PE-64934 |          |
|                                       | 82V2081/2/4/8              |                    | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65415    | PE-64934 |          |
|                                       | 82P2281/2/4/8              |                    | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65415    | PE-64934 |          |
| Infineon<br>Technologies<br>(Siemens) | PEB 2254/55                | E1/T1 & J1         | PE-68786 | T1095         | PE-68887 | PE-68887            | T1215         | —           | —        |          |
|                                       | PEB 2254/55                | E1/T1 & J1         | T1023    | T1096         | PE-68887 | PE-68887            | T1215         | —           | —        |          |
|                                       | PEB 22504, 22554, 2256     | 3.3V               | T1144    | T1144         | —        | —                   | T1219         | —           | —        |          |
|                                       | PEB22554                   | 75 E1              | T1146    | T1146         | —        | —                   | —             | —           | —        |          |
| Intel                                 | LXT 300/301                |                    | PE-65861 | T1090         | PE-68861 | PE-68841            | T1207         | PE-65351    | PE-65351 |          |
|                                       | LXT 304/305/307            | T1,E1              | PE-65861 | T1090         | PE-68861 | PE-68841            | T1207         | PE-65351    | PE-65351 |          |
|                                       | LXT 304/305/307            | T1                 | PE-65865 | T1076         | PE-68865 | PE-68825            | T1209         | PE-65388    | PE-65351 |          |
|                                       | LXT 304/305/307            | 75E1,120E1         | PE-65866 | T1092         | PE-68866 | PE-68826            | T1212         | PE-65389    | PE-65351 |          |
|                                       | LX T 304/305/307           | DSX-1, D4          | T1122    | —             | PE-68881 | PE-68881            | T1216         | PE-65558    | PE-65351 |          |
|                                       | LXT 310/317/318            |                    | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65351    | PE-64936 |          |
|                                       | LXT 312/ 313/ 315          |                    | —        | —             | —        | —                   | —             | PE-64936    | PE-64936 |          |
|                                       | LXT 331                    | T1,E1              | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65351    | PE-64936 |          |
|                                       | LXT 331, LXT 332           |                    | PE-65861 | T1090         | PE-68861 | PE-68841            | T1207         | PE-65351    | PE-65351 |          |
|                                       | LXT 331, LXT 332           |                    | T1122    | —             | PE-68881 | PE-68881            | T1216         | PE-65558    | PE-65351 |          |
|                                       | LXT 331, LXT 332           |                    | PE-65865 | T1076         | PE-68865 | PE-68825            | T1209         | PE-65388    | PE-65351 |          |
|                                       | LXT 334, LXT 335           | T1/E1              | PE-65861 | T1090         | PE-68861 | PE-68841            | T1207         | PE-65351    | PE-65351 |          |
|                                       | LXT 334, LXT 335           | 120/75 E1          | PE-65862 | T1091         | PE-68862 | PE-68822            | T1218         | PE-65586    | PE-65351 |          |
|                                       | LXT 334, LXT 335           | 75 E1              | PE-65866 | T1092         | PE-68866 | PE-68826            | —             | PE-65389    | PE-65351 |          |
|                                       | LXT 334, LXT 335           |                    | T1022    | T1077         | —        | —                   | —             | T1054       | PE-64936 |          |
|                                       | LXT 336                    |                    | PE-65861 | T1090         | PE-68828 | PE-68828            | T1220         | —           | PE-65351 |          |
|                                       | LXT 350, LXT 351, LXT 359  | T1,E1              | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65351    | PE-64936 |          |
|                                       | LXT 350, LXT 351           |                    | PE-65865 | T1076         | PE-68865 | PE-68825            | T1209         | PE-65388    | PE-65351 |          |
|                                       | LXT 350, LXT 351           | 120 E1             | T1122    | —             | PE-68881 | PE-68881            | T1216         | PE-65558    | PE-65351 |          |
|                                       | LXT 360/361/362/363        | T1,E1              | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65351    | PE-64936 |          |
|                                       | LXT 360/361/362/363        |                    | PE-65865 | T1076         | PE-68865 | PE-68825            | T1209         | PE-65388    | PE-65351 |          |
|                                       | LXT 360, LXT361            | 120 E1             | T1122    | —             | PE-68881 | PE-68881            | T1216         | PE-65558    | PE-65351 |          |
|                                       | LXT 380/381/384/386/388    | T1/E1              | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65351    | PE-64936 |          |
| LXT 380/381/384/386/388               | T1/E1                      | PE-65861           | T1090    | PE-68861      | PE-68841 | —                   | PE-65351      | PE-65351    |          |          |
| LXT 3104, LXT 3108                    |                            | PE-65861           | T1090    | PE-68861      | PE-68841 | T1220               | PE-64936      | PE-64936    |          |          |
| LXT 3104, LXT 3108                    |                            | TX1099             | TX1099   | —             | —        | —                   | —             | —           |          |          |
| Agere<br>(Lucent)                     | T7288, T290A               | CEPT               | PE-65862 | T1091         | PE-68862 | PE-68822            | T1208         | PE-65586    | PE-65415 |          |
|                                       | T7289A                     | DS1                | PE-65865 | T1076         | PE-68865 | PE-68825            | T1209         | PE-65379    | PE-65351 |          |
|                                       | T7630, T7688, T7690, T7698 | CEPT               | —        | —             | PE-68884 | PE-68884            | T1214         | PE-65586    | PE-65586 |          |
|                                       | T7630, T7689, T7690, T7698 | DS1                | PE-65870 | T1093         | PE-68874 | PE-68874            | T1211         | PE-65379    | PE-65379 |          |
|                                       | T7693, T7697               | CEPT               | T1137    | TX1287        | —        | —                   | T1217         | —           | —        |          |
|                                       | TLIU04C1                   | DS1                | PE-65870 | T1093         | PE-68874 | PE-68874            | T1211         | PE-65379    | PE-65379 |          |
|                                       | TLIU04C1                   | CEPT               | —        | —             | PE-68884 | PE-68884            | T1214         | PE-65586    | PE-65586 |          |
| Maxim<br>(Dallas)                     | DS2196,2155,2149,21448     |                    | PE-68678 | T1094         | TX1277   | TX1277              | T1212         | PE-65351    | PE-64936 |          |
|                                       | DS2151/2152/2153/2154      |                    | PE-65865 | T1076         | PE-68865 | PE-68825            | T1213         | PE-65388    | PE-64936 |          |
|                                       | DS2151/2152/2153/2154      |                    | T1136    | T1091         | PE-68862 | PE-68822            | T1218         | PE-65586    | PE-64936 |          |
|                                       | DS2148/Q48/Q348/349/Q59    | 3V                 | PE-68678 | T1094         | TX1277   | TX1277              | T1212         | PE-65351    | PE-64936 |          |
|                                       | DS2148/Q48                 | 5V                 | T1136    | T1091         | PE-68862 | PE-68822            | T1218         | PE-65586    | PE-64936 |          |
|                                       | DS21352/Q352, DS21354/Q354 |                    | PE-68678 | T1094         | TX1277   | TX1277              | T1212         | PE-65351    | PE-64936 |          |
|                                       | DS21552/Q552, DS21554/Q554 |                    | PE-65865 | T1076         | PE-68865 | PE-68825            | T1213         | PE-65388    | PE-64936 |          |
|                                       | DS21552/Q552, DS21554/Q554 |                    | T1136    | T1091         | PE-68862 | PE-68822            | T1218         | PE-65586    | PE-64936 |          |
|                                       | DS26502/3                  |                    | PE-68678 | T1094         | TX1277   | TX1277              | T1212         | PE-65351    | PE-64936 |          |
|                                       | DS21455/8                  |                    | PE-68678 | T1094         | TX1277   | TX1277              | T1212         | PE-65351    | PE-64936 |          |
|                                       | DS26528                    |                    | PE-68678 | T1094         | TX1277   | TX1277              | T1212         | PE-65351    | PE-64936 |          |
|                                       | Mindspeed                  | BT8510             | T1/E1    | PE-65866      | T1092    | PE-68866            | PE-68826      | T1212/T1210 | PE-65389 | PE-65351 |
|                                       |                            | BT8510             | T1/E1    | T1021         | T1092    | T1021               | PE-68826      | T1212/T1210 | PE-65389 | PE-65351 |
| CN8380/28380                          |                            |                    | —        | —             | —        | —                   | —             | —           | —        |          |
| BT8370/5/6                            |                            | Better Rl          | T1190    | T1091         | PE-68862 | PE-68822            | T1218         | PE-64937    | PE-64936 |          |
| BT8370/5/6                            | Low Power                  | PE-65865           | T1076    | —             | PE-68825 | T1213               | PE-65388      | PE-64936    |          |          |
| PMC-Sierra                            | PM4341/6341/4314           |                    | PE-65862 | T1091         | PE-68862 | PE-68822            | T1208         | PE-64937    | PE-65351 |          |
|                                       | PM4318/4319                |                    | PE-65861 | T1090         | PE-68861 | PE-68841            | T1207         | PE-65351    | PE-65351 |          |
|                                       | PM4323/4325                |                    | PE-65861 | T1090         | PE-68861 | PE-68841            | T1207         | PE-65351    | PE-65351 |          |
|                                       | PM4329                     |                    | —        | —             | —        | —                   | —             | —           | —        |          |
| PM4351/4354                           | COMET                      | T1137              | TX1287   | —             | —        | T1217               | —             | —           |          |          |
| Zarlink<br>(Mitel)                    | MT9071, MT9076             |                    | T1137    | TX1287        | —        | —                   | T1217         | —           | —        |          |
|                                       | MT9076, MT9075             |                    | T1144    | T1144         | —        | —                   | T1219         | —           | —        |          |
|                                       | MT9074, MT9075             |                    | PE-68678 | T1094         | PE-68877 | PE-68877            | T1212         | PE-65351    | PE-64934 |          |

Read across →

# TELECOM IC CROSS REFERENCE



## IC CROSS REFERENCE: T1/E1/CEPT/ISDN-Pri FOR SINGLE & MULTIPOINT PORT ICs

| SINGLE THT    |          | DUAL THT |          | REINFORCED 3 kVRMS |          |          | QUAD SMT      |       | OCTAL SMT | PROTECTION MODULES |          |          |
|---------------|----------|----------|----------|--------------------|----------|----------|---------------|-------|-----------|--------------------|----------|----------|
| EXTENDED TEMP |          | STD TEMP | EXT TEMP | STANDARD TEMP      |          | DUAL SMT | STANDARD TEMP |       | STD TEMP  | EXT TEMP           | STD TEMP | EXT TEMP |
| TX            | RX       | TX       | RX       | TX                 | RX       | TX & RX  | TX            | RX    | TX & RX   | TX & RX            | TX & RX  | TX & RX  |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1065     | T1105              | —        | —        |
| PE-65770      | PE-65771 | PE-65565 | PE-65567 | PE-65838           | PE-65835 | T1034    | T1007         | T1006 | T1070     | T1110              | —        | —        |
| PE-68664      | PE-65771 | PE-65566 | PE-65568 | PE-65839           | PE-65835 | T1049    | T1009         | T1006 | T1068     | T1108              | —        | —        |
| PE-68664      | PE-65771 | PE-65566 | PE-65568 | PE-65839           | PE-65835 | T1049    | T1009         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65838           | PE-65835 | T1045    | T1006         | T1006 | T1073     | T1113              | —        | —        |
| PE-65770      | PE-65770 | —        | —        | PE-65838           | PE-65838 | T1033    | T1007         | T1007 | T1064     | T1104              | —        | —        |
| PE-65771      | —        | PE-64951 | PE-65568 | PE-65835           | PE-65835 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1081    | —             | —     | —         | —                  | —        | —        |
| PE-65770      | PE-65771 | PE-65565 | PE-65567 | PE-65838           | PE-65835 | T1034    | T1007         | T1006 | T1070     | T1110              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1065     | T1105              | —        | —        |
| PE-65770      | PE-65770 | —        | —        | PE-65838           | PE-65838 | T1033    | T1007         | T1007 | T1064     | T1104              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1065     | T1105              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1065     | T1105              | —        | —        |
| PE-68664      | PE-65778 | PE-65566 | PE-65568 | PE-65839           | PE-65834 | T1049    | T1009         | T1009 | T1071     | T1111              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1065     | T1105              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65340      | PE-65771 | PE-64952 | PE-65774 | PE-65837           | PE-65835 | T1044    | T1008         | T1008 | T1067     | T1107              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1124     | T1114              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1124     | T1114              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| —             | —        | —        | —        | —                  | PE-68788 | PE-68788 | T1037         | —     | T1069     | T1109              | —        | —        |
| —             | —        | —        | —        | —                  | PE-68788 | PE-68788 | T1080         | —     | T1069     | T1109              | —        | —        |
| —             | —        | —        | —        | —                  | —        | —        | —             | —     | T1142     | T1231              | —        | TX9031   |
| —             | —        | —        | —        | —                  | —        | —        | —             | —     | —         | —                  | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1065     | T1105              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1065     | T1105              | —        | —        |
| PE-65770      | PE-65771 | PE-65565 | PE-65567 | PE-65838           | PE-65835 | T1034    | T1016         | T1016 | T1070     | T1110              | —        | —        |
| PE-68664      | PE-65771 | PE-65566 | PE-65568 | PE-65839           | PE-65835 | T1049    | T1009         | T1009 | T1071     | T1111              | —        | —        |
| —             | —        | —        | —        | —                  | —        | T1047    | —             | —     | —         | —                  | —        | —        |
| PE-65771      | PE-65778 | PE-64954 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-68600      | PE-65778 | —        | PE-64950 | PE-65836           | PE-65834 | —        | —             | —     | —         | —                  | —        | —        |
| PE-65771      | PE-65778 | PE-64954 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1065     | T1105              | —        | —        |
| —             | —        | —        | —        | —                  | —        | T1047    | —             | —     | —         | —                  | —        | —        |
| PE-65770      | PE-65771 | PE-65565 | PE-65567 | PE-65838           | PE-65835 | T1034    | T1016         | T1016 | T1070     | T1110              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1065     | T1105              | —        | —        |
| PE-65340      | PE-65771 | PE-64952 | PE-65771 | PE-65832           | PE-65835 | T1035    | T1001         | T1001 | T1067     | T1107              | —        | —        |
| PE-68664      | PE-65771 | PE-65566 | PE-65568 | PE-65839           | PE-65835 | T1049    | T1009         | T1009 | T1071     | T1111              | —        | —        |
| —             | —        | —        | —        | —                  | —        | —        | —             | —     | —         | —                  | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | —        | PE-65835           | PE-65835 | T1030    | —             | T1006 | T1065     | T1105              | —        | —        |
| PE-65771      | PE-65778 | PE-64954 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65770      | PE-65771 | PE-65565 | PE-65567 | PE-65838           | PE-65835 | T1034    | T1016         | T1016 | T1070     | T1110              | —        | —        |
| —             | —        | —        | —        | —                  | —        | T1047    | —             | —     | —         | —                  | —        | —        |
| PE-65771      | PE-65778 | PE-64954 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65770      | PE-65771 | PE-65565 | PE-65567 | PE-65838           | PE-65835 | T1034    | T1016         | T1016 | T1070     | T1110              | —        | —        |
| —             | —        | —        | —        | —                  | —        | T1047    | —             | —     | —         | —                  | —        | —        |
| PE-65771      | PE-65778 | PE-64954 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65771 | PE-65565 | PE-65567 | PE-65838           | PE-65835 | T1034    | T1016         | T1016 | T1070     | T1110              | —        | —        |
| —             | —        | —        | —        | —                  | —        | T1047    | —             | —     | —         | —                  | —        | —        |
| PE-65771      | PE-65778 | PE-64954 | —        | PE-65835           | PE-65834 | T1031    | T1006         | T1006 | T1068     | T1108              | T9030    | T9030    |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1124     | T1114              | T9030    | T9030    |
| PE-65778      | PE-65778 | PE-64951 | —        | PE-65835           | PE-65835 | T1030    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| —             | —        | —        | —        | —                  | —        | —        | —             | —     | —         | —                  | —        | —        |
| PE-65340      | PE-65771 | PE-64952 | PE-65774 | PE-65832           | PE-65835 | T1044    | T1008         | T1008 | T1067     | T1107              | —        | —        |
| PE-65770      | PE-65771 | PE-65565 | PE-65567 | PE-65838           | PE-65835 | T1034    | T1007         | T1006 | T1070     | T1110              | —        | —        |
| PE-65340      | PE-65340 | —        | —        | PE-65832           | PE-65832 | T1036    | T1010         | T1010 | T1063     | T1103              | —        | —        |
| PE-65770      | PE-65770 | —        | —        | PE-65838           | PE-65838 | T1033    | T1007         | T1007 | T1064     | T1104              | —        | —        |
| —             | —        | —        | —        | —                  | —        | —        | —             | —     | —         | T1180              | —        | —        |
| PE-65770      | PE-65770 | —        | —        | PE-65838           | PE-65838 | T1033    | T1007         | T1007 | T1064     | T1104              | —        | —        |
| PE-65340      | PE-65340 | —        | —        | PE-65832           | PE-65832 | T1036    | T1010         | T1010 | T1063     | T1103              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | PE-65568 | PE-65838           | PE-65838 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65770      | PE-65778 | PE-65565 | PE-65567 | PE-65838           | PE-65834 | T1032    | T1007         | T1006 | T1070     | T1110              | —        | —        |
| PE-65340      | PE-65778 | PE-64952 | PE-65774 | PE-65832           | PE-65834 | T1038    | T1001         | T1001 | TX1292    | TX1292             | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | PE-65568 | PE-65838           | PE-65838 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65340      | PE-65778 | PE-64952 | PE-65774 | PE-65832           | PE-65834 | T1038    | T1001         | T1001 | TX1292    | TX1292             | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | PE-65568 | PE-65838           | PE-65838 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | PE-65568 | PE-65838           | PE-65838 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | PE-65568 | PE-65838           | PE-65838 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-65771      | PE-65778 | PE-64951 | PE-65568 | PE-65838           | PE-65838 | T1031    | T1006         | T1006 | T1068     | T1108              | —        | —        |
| PE-68664      | PE-65771 | PE-65566 | PE-65568 | PE-65839           | PE-65835 | T1049    | T1009         | T1006 | T1071     | T1111              | —        | —        |
| PE-68664      | PE-65771 | PE-65566 | PE-65568 | PE-65839           | PE-65835 | T1049    | T1009         | T1006 | T1071     | T1111              | —        | —        |
| —             | —        | —        | —        | —                  | —        | —        | —             | T1006 | T1071     | T1111              | —        | —        |
| PE-65340      | PE-65771 | PE-64952 | PE-65774 | PE-65832           | PE-65834 | T1038    | T1006         | T1001 | T1067     | T1107              | —        | —        |
| PE-65770      | PE-65771 | PE-65565 | PE-65567 | PE-65838           | PE-65834 | T1032    | T1006         | T1007 | T1070     | T1110              | —        | —        |
| PE-65340      | PE-65771 | PE-64952 | PE-65774 | PE-65832           | PE-65835 | T1044    | T1008         | T1008 | T1067     | T1107              | —        | —        |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1073     | T1113              | —        | TX9023   |
| PE-65771      | PE-65771 | PE-64951 | —        | PE-65835           | PE-65835 | T1045    | T1006         | T1006 | T1073     | T1113              | —        | TX9023   |
| —             | —        | —        | —        | —                  | —        | —        | —             | —     | —         | —                  | —        | TX9027   |
| —             | —        | —        | —        | —                  | —        | T1082    | —             | —     | —         | —                  | —        | TX9020   |
| —             | —        | —        | —        | —                  | —        | —        | —             | —     | T1180     | TX1299             | T9021    | —        |
| —             | —        | —        | —        | —                  | —        | —        | —             | —     | T1180     | —                  | —        | —        |
| PE-65771      | PE-65778 | PE-64954 | PE-65568 | PE-65835           | PE-65834 | T1031    | —             | —     | T1142     | T1231              | —        | —        |
| —             | —        | —        | —        | —                  | —        | —        | —             | —     | T1068     | T1108              | —        | —        |

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