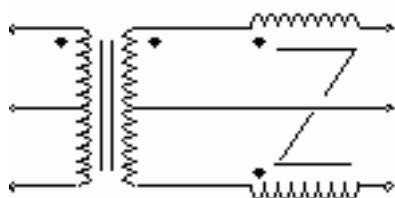
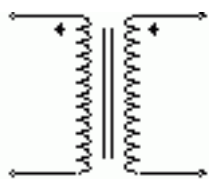




Transformers & Magnetics for Data Communications

Products Include ...



ADSL
DSL
HDSL
ISDN S/U
T1/CEPT/PCM
DDS
T3/E3/DS3
LAN/WAN
Ethernet
10 BASE-T
100 BASE-T
1000 BASE-T
Data Line Filters
Multi-Purpose
Wide Band (RF)



www.rhombus-ind.com



Rhombus Industries Incorporated is a privately owned corporation and a leading designer and manufacturer of transformers and magnetic products. Our headquarters is located in Santa Ana, California and

includes engineering, research and development, prototype manufacturing capabilities, sales and extensive in-house testing capabilities. All product is manufactured at our privately owned and operated sub-assembly operation located in Thailand.

Since our founding in 1970, insuring the accuracy, consistency, and overall quality of Rhombus products is of primary concern. All of our products are designed and built to meet the most demanding reliability requirements. We have an extensive quality control program which incorporates statistical process control and is also in strict compliance with MIL-I-45208.

For over 45 years, Rhombus has gained unique experience in providing quality components and innovative designs for users of magnetic products. Rhombus welcomes custom designs tailored to unique customer requirements. Our dedicated employees look forward to proving to you that Rhombus offers the price, delivery and application support advantages that can address your most critical needs.

For Downloadable Catalogs and Data Sheets, as well as Complete On-line Magnetic Product resources please visit us on the web at

www.rhombus-ind.com

Cross Reference

Application Notes

Part Index

with links to data sheets

I.C. Guide

Inductor Selction Guide

CM Choke Guide

Sales Representatives

Catalogs

Transformers (Datacomm) Catalog

Mag. Componentents (Power/SMPS) Catalog

Audio Magnetics Catalog

Delay Line Catalog

Transformers & Magnetics for Data Communications

Description	Page
T1/E1 Quad Port Xfmr Modules	T-161XX 2
T1/CEPT Dual Port Xfmr Modules	T-162XX 4
T1/CEPT Dual 16 Pin 50 mil	T-141XX 6
T1/CEPT Single 6-Pin Xfmrs	T-102XX 8
T1/CEPT Single 6-Pin Xfmrs	T-103XX 8
T1/CEPT Dual 12 Pin SMD	T-144XX 9
T1/CEPT/PCM EP Core Xfmrs	T-138XX 10
T1/CEPT 3kV Reinforced xfmrs	T-136XX 11
T1/E1 Common Mode Chokes	F-19XX 12
T3 Interface xfmrs	T-131XX 13
ISDN S-Interface Single xfmrs	T-104XX 14
ISDN S-Interface Single SMD.....	T-134XX 14
ISDN S-Interface Dual xfmrs	T-105XX 15
ISDN S-Interface Dual SMD	T-135XX 15
ISDN U-Interface xfmrs	T-132XX 16
HDSL Transformers (EP13)	misc. 17
HDSL Transformers (RS)	misc. 18
HDSL2 Transformer	T-1316 (G) 19
ADSL Transformers	T-111X (G) 20
DSL Transformer.....	T-1328 20
Ethernet xfmrs Triple/Quad	misc. 21
10 Base-T Transformers	misc. 22
10 Base-T Quad Port Xfmr Modules	T-174XX 23
10 Base-T Single Port Xfmr Modules ...	T-1700X 26
10/100 Base-T Quad Port Xfmr Mod. ..	T-171XX 27
10/100 Base-T Single Port Xfmr Mod. .	T-1720X 30
10/100 Base-T Dual Port Xfmr Mod.	T-163XX 31
1000 Base-T Port Xfmr Mod.	T-1730X 33
Data Line Filters	F-150X 34
Common Mode Filter Chokes	F-13XX/16XX 35
DDS Application xfmr	misc. 36
Digital Audio	misc. 37
Balun Transformers.....	misc. 38
Wideband RF	T-120XX 39
Multi Purpose Transformers	misc. 40
MAX253 Interface Transformers	misc. 42

T1/E1 ISDN PRI Quad Port 40-Pin Transformer Modules

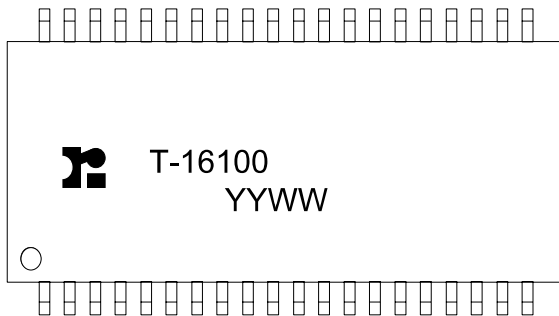
For T1/E1/ISDN PRI Telecom
Dual and Quad Transceiver Applications
1500 V_{RMS} minimum Isolation
40-Pin Surface Mount 50 mil style package

Electrical Specifications at 25° C ^{(1), (2)}

Part Number	Turns Ratio (± 5%)	OCL min. (mH)	PRI-SEC C _{WV} max. (pF)	L _L max. (μH)	PRI. DCR max. (Ω)	SEC. DCR max. (Ω)	Schematic Style
T-16100	1:1.36CT & 1:2CT	1.2	35	0.6	0.7	0.9	40-3
T-16101	1:2CT & 1:2CT	1.2	35	0.6	0.8	1.8	40-3
T-16102	1:1:1.26 & 1:2CT	1.2	35	0.6	0.8	0.8 / 1.8	40-2
T-16103	1:1.15 & 1:2CT	1.2	35	0.6	0.8	0.8 / 1.8	40-1
T-16104	1:1CT & 1:1CT	1.2	35	0.6	0.8	0.8	40-3
T-16105	1:2.4 & 1:1	1.0	35	0.5	0.8	1.8 / 0.8	40-6
T-16106	1:2CT & 1:1CT	1.2	35	0.6	0.8	1.8 / 0.8	40-2
T-16107	1CT:2CT & 1:1	1.2	35	0.6	0.7	0.9	40-8
T-16108	1:2CT & 1:1.36	1.2	35	0.6	0.8	1.8 / 0.8	40-7
T-16109	1:1.14CT & 1:2CT	1.2	35	0.6	0.7	0.9	40-3
T-16110	1:1.36 & 1:2CT	1.2	35	0.6	0.7	1.0	40-1
T-16111	1:1.36 & 1:1.36CT	1.2	35	0.4 / 0.5	0.7	1.0	40-1
T-16112	1:1.15 & 1:1.15	1.2	35	0.6	0.8	0.8 / 1.8	40-5
T-16113	1:1.14 & 1:1.14CT	1.2	35	0.6	0.8	0.8 / 1.8	40-1
T-16114	1:2 & 1:2CT	1.2	35	0.6	0.8	1.8	40-4
T-16115	1:2 & 1:2	1.2	35	0.6	0.8	1.8	40-5
T-16116	1CT:1.41 & 1CT:1.41	1.2	35	0.6	0.8	1.8	40-3
T-16117	1:2CT & 1CT:2	1.2	35	0.6	0.7 / 1.0	1.0 / 0.7	40-3

- ET-Product of 10 V-μsec min.
 - OCL Measured across Primary 100 kHz/100mV.
- Designed to comply with UL1950 & EN 60950.
Crosstalk: 65 dB Min.

*Available on
Tape & Reel*

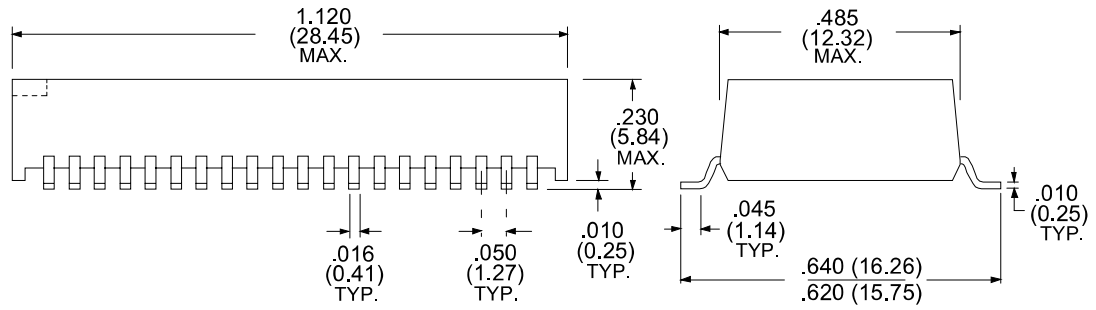


For complete details including downloadable
PDF catalogs and data sheets please visit
www.rhombus-ind.com

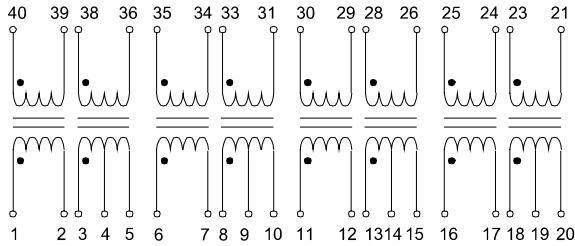
Refer to Schematic Diagrams on following page

Part Number	Primary Pins
T-16100	24-25, 29-30, 34-35, 39-40 / 4-5, 9-10, 14-15, 19-20
T-16101	4-5, 9-10, 14-15, 19-20 / 24-25, 29-30, 34-35, 39-40
T-16102	1-2, 6-7, 11-12, 16-17 / 21-22, 26-27, 31-32, 36-37
T-16103	1-2, 6-7, 11-12, 16-17 / 21-23, 26-28, 31-33, 36-38
T-16104	4-5, 9-10, 14-15, 19-20 / 24-25, 29-30, 34-35, 39-40
T-16105	1-2, 8-9, 11-12, 18-19 / 24-25, 27-28, 34-35, 37-38
T-16106	1-2, 6-7, 11-12, 16-17 / 21-22, 26-27, 31-32, 36-37
T-16107	1-3, 6-8, 11-13, 16-18 / 21-22, 26-27, 31-32, 36-37
T-16108	24-25, 29-30, 34-35, 39-40 / 4-5, 9-10, 14-15, 19-20
T-16109	24-25, 29-30, 34-35, 39-40 / 4-5, 9-10, 14-15, 19-20
T-16110	1-2, 6-7, 11-12, 16-17 / 38-36, 33-31, 28-26, 23-21
T-16111	1-2, 6-7, 11-12, 16-17 / 38-36, 33-31, 28-26, 23-21
T-16112	1-3, 6-8, 11-13, 16-18 / 4-5, 9-10, 14-15, 19-20
T-16113	1-2, 6-7, 11-12, 16-17 / 38-36, 33-31, 28-26, 23-21
T-16114	1-2, 9-10, 11-12, 19-20 / 23-25, 26-28, 33-35, 36-38
T-16115	1-3, 6-8, 11-13, 16-18 / 4-5, 9-10, 14-15, 19-20
T-16116	1-3, 6-8, 11-13, 16-18 / 21-23, 26-28, 31-33, 36-38
T-16117	4-5, 9-10, 14-15, 19-20 / 1-3, 6-8, 11-13, 16-18

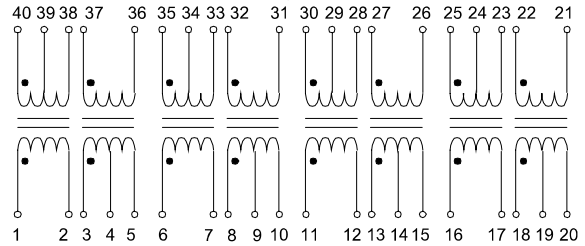
40-Pin 50 mil SMD Package Physical Dimensions in inches (mm)



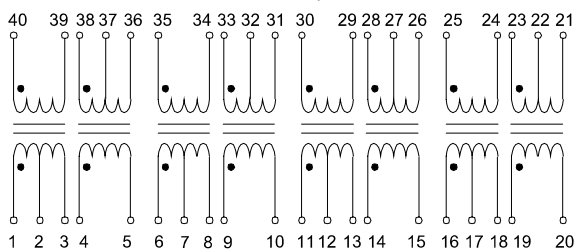
Schematic Style "40-1"



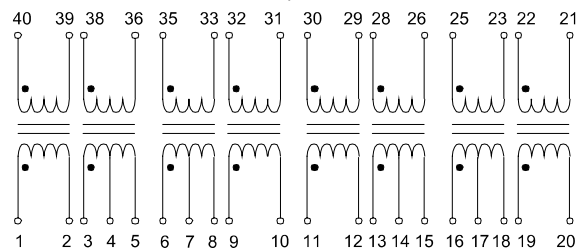
Schematic Style "40-2"



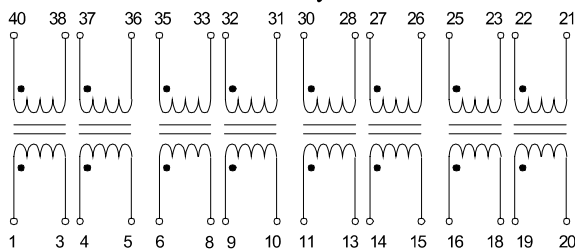
Schematic Style "40-3"



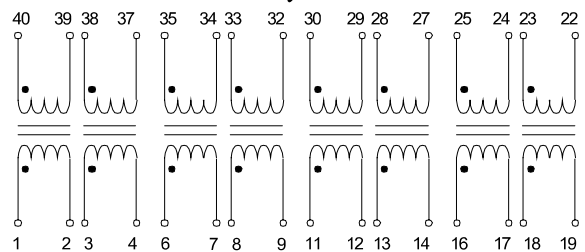
Schematic Style "40-4"



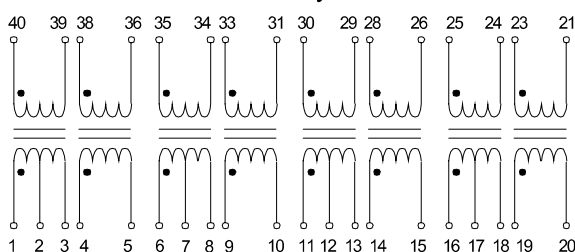
Schematic Style "40-5"



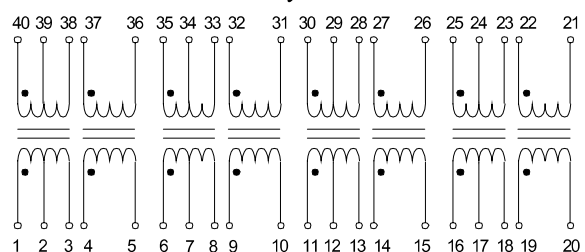
Schematic Style "40-6"



Schematic Style "40-7"



Schematic Style "40-8"



T1 / CEPT / ISDN-PRI Dual Port SMD 40-Pin Modules 4 Transformers Per Part

For T1/CEPT/PRI Telecom Applications
Designed to meet CCITT and FCC Requirements
Dual Port Design
1500 VRMS Minimum Isolation

Electrical Specifications ¹ at 25° C

Part Number	Turns Ratio ± 5%	OCL Min. (mH)	C _{www} max. (pF)	L _L max. (μH)	DCR Pri. max. (Ω)	DCR Sec. max. (Ω)	Schem. Style
T-16200	1:1.36CT & 1:2CT	1.2	35	0.6	0.7	0.9	3
T-16201	1:2CT & 1:2CT	1.2	35	0.6	0.8	1.8	3
T-16202	1:1:1.26 & 1:2CT	1.2	35	0.6	0.8	0.8 / 1.8	2
T-16203	1:1.15 & 1:2CT	1.2	35	0.6	0.8	0.8 / 1.8	1
T-16204	1:1CT & 1:1CT	1.2	35	0.6	0.8	0.8	3
T-16205	1CT:2CT & 1CT:2CT	1.2	35	0.6	0.7	1.4	8
T-16206	1:2CT & 1:1CT	1.2	35	0.6	0.8	1.8 / 0.8	2
T-16207	1CT:2CT & 1:1	1.2	35	0.6	0.7	0.9	6
T-16208	1:2CT & 1:1.36	1.2	35	0.6	0.8	1.8 / 0.8	7
T-16209	1:1.14CT & 1:2CT	1.2	35	0.6	0.7	0.9	3
T-16210	1:1.36 & 1:2CT	1.2	35	0.6	0.7	1.0	1
T-16211	1:1.36 & 1:1.36CT	1.2	35	0.4 / 0.5	0.7	1.0	1
T-16212	1:1.15 & 1:1.15	1.2	35	0.6	0.8	0.8 / 1.8	5
T-16213	1:1.14 & 1:1.14CT	1.2	35	0.6	0.8	0.8 / 1.8	1
T-16214	1:2 & 1:2CT	1.2	35	0.6	0.8	1.8	4
T-16215	1:2 & 1:2	1.2	35	0.6	0.8	1.8	5
T-16216	1CT:1.41 & 1CT:1.41	1.2	35	0.6	0.8	1.8	3
T-16217	1:2CT & 1CT:2	1.2	35	0.6	0.7 / 1.0	1.0 / 0.7	3

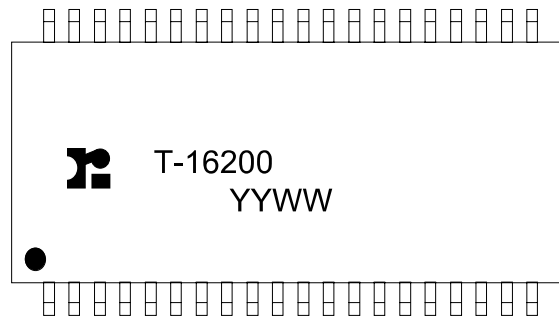
1. OCL Tested at 100kHz 50mV

Refer to Schematic Diagrams on following pages.

Part Number	Primary Pins
T-16200	28-30, 38-40 / 6-8, 16-18
T-16201	6-8, 16-18 / 28-30, 38-40
T-16202	1-3, 11-13 / 23-25, 33-35
T-16203	1-3, 11-13 / 23-25, 33-35
T-16204	6-8, 16-18 / 28-30, 38-40
T-16205	6-8, 16-18 / 28-30, 38-40
T-16206	1-3, 11-13 / 23-25, 33-35
T-16207	1-3, 11-13 / 23-25, 33-35
T-16208	28-30, 38-40 / 6-8, 16-18
T-16209	28-30, 38-40 / 6-8, 16-18
T-16210	1-3, 11-13 / 23-25, 33-35
T-16211	1-3, 11-13 / 23-25, 33-35
T-16212	1-3, 11-13 / 6-8, 16-18
T-16213	1-3, 11-13 / 23-25, 33-35
T-16214	1-3, 16-18 / 28-30, 33-35
T-16215	1-3, 11-13 / 6-8, 16-18
T-16216	1-3, 11-13 / 23-25, 33-35
T-16217	6-8, 16-18 / 1-3, 11-13

Flammability: Materials used in the production of these units meet requirements of UL94-VO and IEC 695-2-2 needle flame test.

Other Configurations and Packages Available
See Our Web Page Under Data Communications/T1



Parts shipped in anti-static tubes.

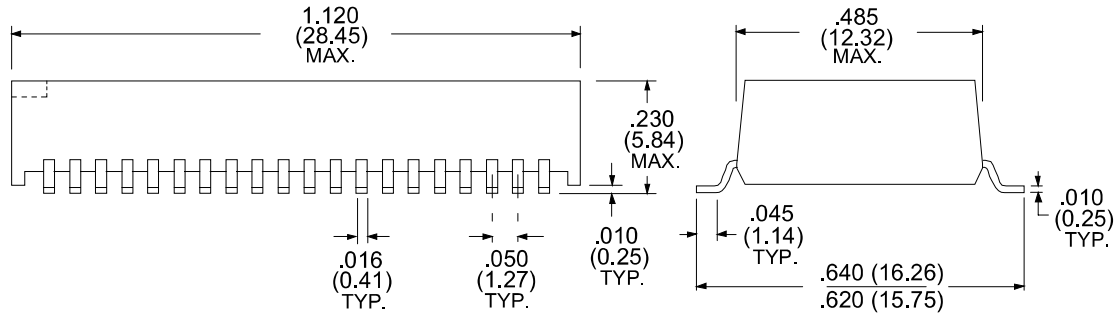
Tape & Reel Available upon request.

For complete details including downloadable PDF catalogs and data sheets please visit

www.rhombus-ind.com

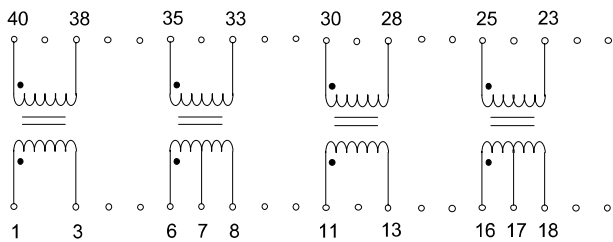
PT21

40-Pin 50 mil SMD Package Physical Dimensions in inches (mm)

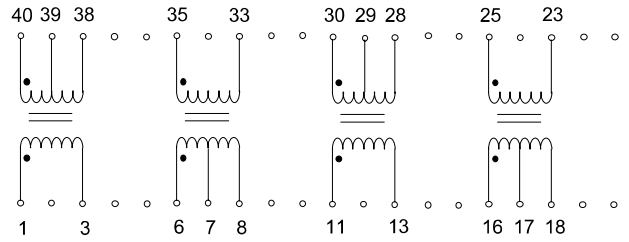


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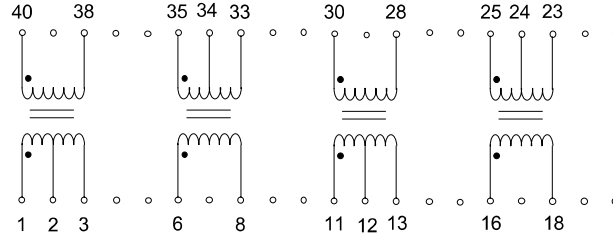
Schematic Style "1"



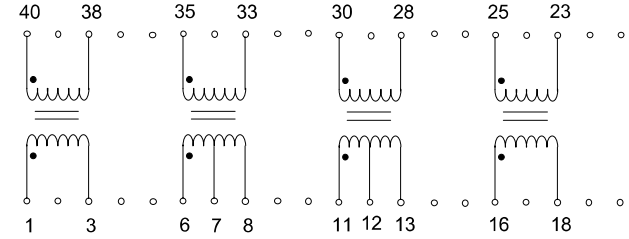
Schematic Style "2"



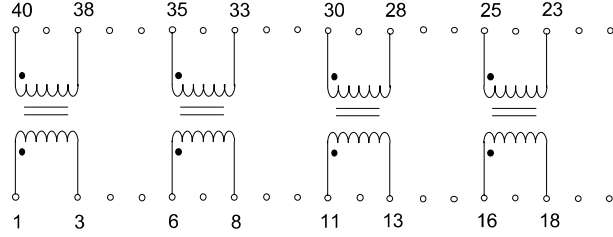
Schematic Style "3"



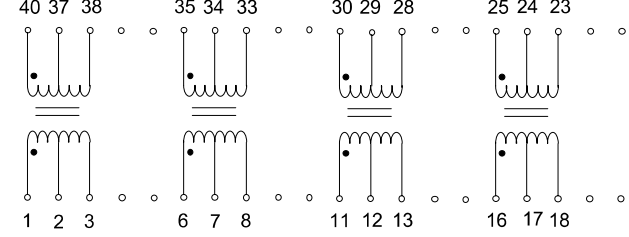
Schematic Style "4"



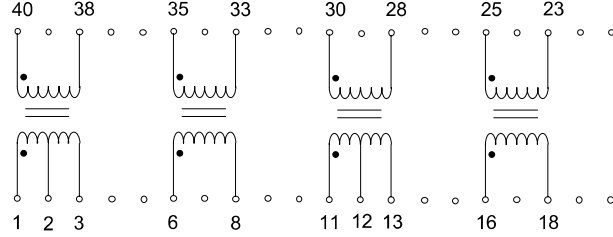
Schematic Style "5"



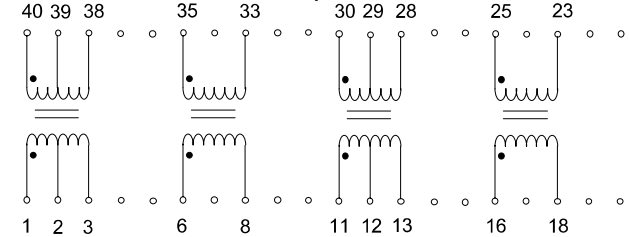
Schematic Style "6"



Schematic Style "7"



Schematic Style "8"



T1 / CEPT / ISDN PRI SMD Transformers Dual Configuration

For T1/CEPT/ISDN PRI Telecom Applications
1500 V_{RMS} minimum Isolation - Selected units 2000 V_{RMS}
Small footprint / Surface Mount 50 mil style package
Designed to meet CCITT and FCC Requirements
Custom Designs Available

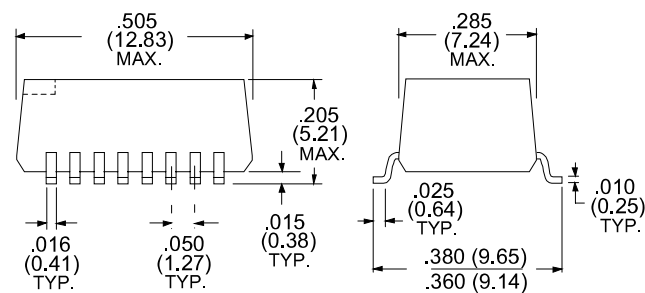
Electrical Specifications at 25° C

Part Number	Turns Ratio (± 5%)	OCL min. (mH)	PRI-SEC C _{WV} max. (pF)	Leakage Induct. max. (μH)	PRI. DCR max. (Ω)	SEC. DCR max. (Ω)	Schematic Style (see pg 7)	Primary Pins
T-14100	1:1.36CT & 1:2CT	1.5	50	0.5	0.7	0.9	A	16-14,6-8
T-14101 ⁽³⁾	1:2CT & 1:2CT	1.2	50	0.8	0.8	1.8	A	16-14,6-8
T-14102 ⁽³⁾	1:1:1.266 & 1:2CT	1.2	50	0.8	0.8	0.8 / 1.8	A	16-14,6-8
T-14103 ⁽³⁾	1:1.15CT & 1:2CT	1.2	50	0.5 / 0.8	0.8	0.8 / 1.8	A	16-14,6-8
T-14104 ⁽³⁾	1:1CT & 1:1CT	1.2	50	0.8	0.8	0.8	A	16-14,6-8
T-14105 ⁽³⁾	1:2.3CT & 1:1CT	1.2	50	0.8	0.8	1.8 / 0.8	A	16-14,6-8
T-14106 ⁽³⁾	1:1.38CT & 1:1:1	1.2	50	0.8 / 0.5	0.8	0.8	F	1-2
T-14107 ⁽³⁾	1CT:2CT & 1:1	1.2	50	0.8 / 0.5	0.8	1.8 / 0.8	D	1-3,9-11
T-14108 ⁽³⁾	1:2CT & 1:1.36	1.2	50	0.8	0.8	1.8 / 0.8	E	1-3,9-11
T-14109	1CT:2CT & 1CT:2CT	1.5	35	0.8	0.7	1.4	G	16-14,6-8
T-14110	1:1.14CT & 1:2CT	1.5	40	0.5 / 0.8	0.7	0.9	A	16-14,6-8
T-14111	1:1.36 & 1:2CT	1.5	40	0.5 / 0.8	0.7	1.0	A	16-14,6-8
T-14112	1CT:2CT & 1:1:1.15:1.266:2	1.2 1.2	50 50	0.6 0.6	1.0 1.0	1.0 1.0	H	16-14 6-8
T-14113	1:2CT & 1:1:1.15:1.266:2	1.2 1.2	50 50	0.6 0.6	1.0 1.0	1.0 1.0	I	16-14 6-8
T-14114	1:1:1.15:1.25 & 1:2CT	1.5 1.5	35 35	0.5 0.5	0.7 0.7	0.9 0.9	J	16-14 6-8
T-14150	1:2CT & 2CT:1	2.0	45	.6 / .6	0.7 / 1.0	1.0 / 0.7	C	16-14, 6-8
T-14151	1CT:2CT & 1:1	1.2	30	.55 / .5	0.7	1.1 / 0.7	D	1-3, 11-9
T-14152	1.58:2CT & 1.58:1	0.8	30	0.5	0.5	0.5 / 0.3	E	1-3, 6-8
T-14153	1:1CT & 2:1	0.8	30	0.6	0.5	0.5 / 0.2	E	1-3, 6-8
T-14154	2.62:2CT & 2.62:1	1.2	30	0.8	0.6	0.5 / 0.3	E	1-3, 6-8
T-14155	1:1 & 1CT:1	1.2	30	0.5 / 0.8	0.7	0.7	E	6-8, 16-14
T-14156	1:1CT & 2.53CT:1	0.06 / 2.0	23 / 25	0.75 / 1.5	0.6 / 0.7	0.6 / 1.0	C	9-11, 1-3
T-14157	1:1CT & 2CT:1	0.06 / 3.2	25 / 30	0.75 / 0.8	0.6 / 0.7	0.6 / 0.7	C	9-11, 1-3
T-14158	1:1.15CT & 1:2CT	1.5 1.2	35 40	0.6 0.5	0.7 0.7	0.9 1.1	A	16-14 6-8
T-14159	1:1:1.266 & 1:2CT	1.5 1.2	35 40	0.4 0.5	0.7 0.7	0.9 1.1	A	16-14 6-8
T-14160	1CT:1CT & 1:1.36CT	1.2	35	0.8	0.8	0.9	K	6-8

- ET-Product of 10 V-μsec min.
- OCL Measured across Primary @ 100 kHz & 100mV.
- 2000 V_{RMS} minimum Isolation.

Available on Tape & Reel

Dimensions in Inches (mm)



For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

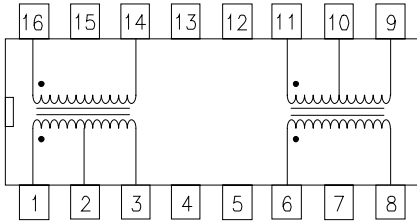
PT21

T1/CEPT/ISDN PRI Dual Transformers

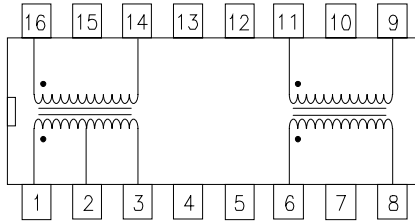
Schematics Diagrams for 16-Pin 50 Mil Package

(Refer to Table on previous page)

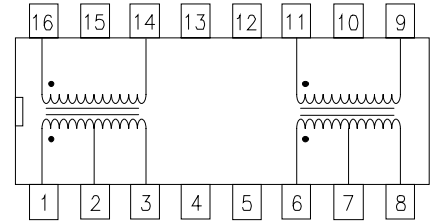
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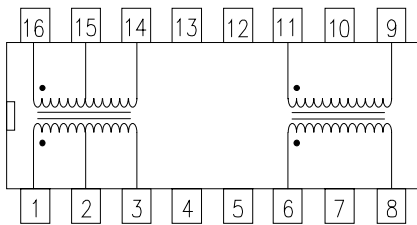
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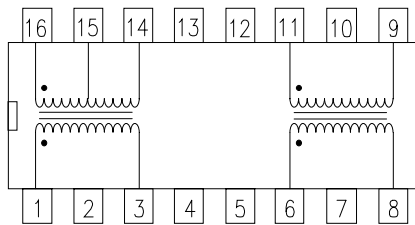
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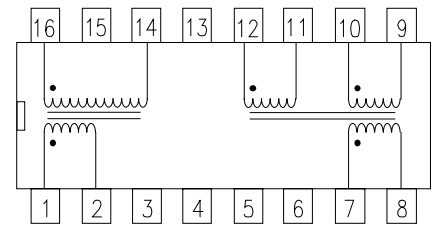
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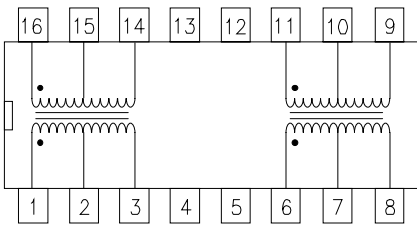
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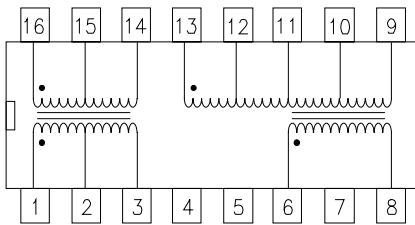
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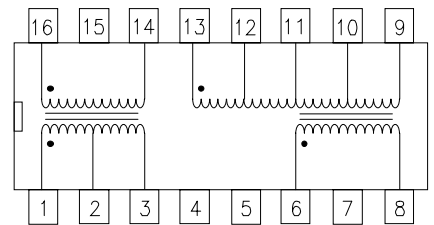
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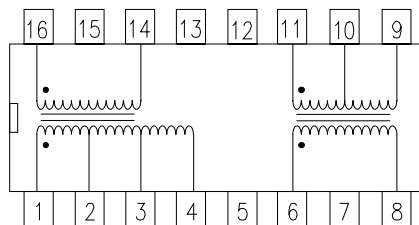
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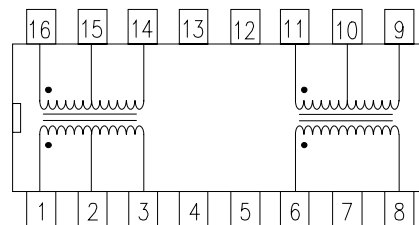
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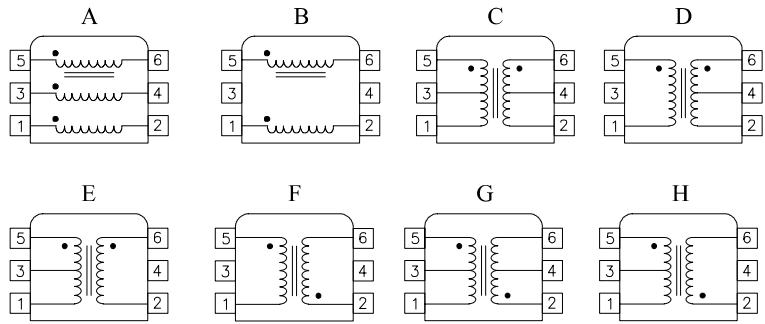
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For complete details including downloadable
PDF catalogs and data sheets please visit
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Single T1/CEPT Transformers

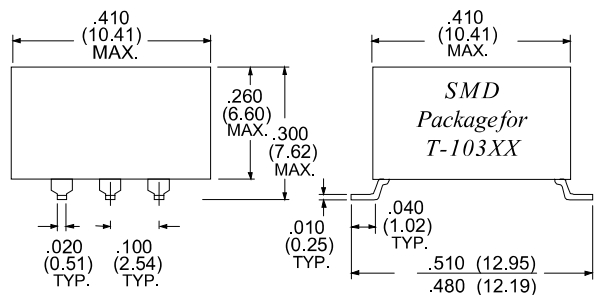
For T1/CEPT Telecom Applications
 Designed to meet CCITT & FCC Requirements
 1500 VRMS Minimum Isolation



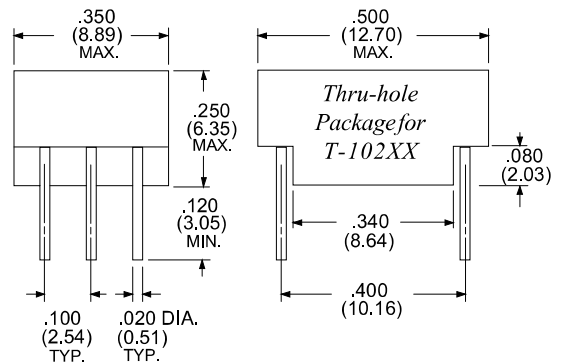
Electrical Specifications ^{1,2} at 25°C

Thru-hole Part Number	SMD Part Number	Turns Ratio ($\pm 5\%$)	OCL min. (mH)	PRI-SEC C_{www} max. (pF)	Leakage L_L max. (μ H)	Pri. DCR max. (Ω)	Sec. DCR max. (Ω)	Schem. Style	Primary Pins
T-10200	T-10300	1:1:1	1.2	25	0.5	0.7	0.7	A	
T-10201	T-10301	1:1:1	2.0	40	0.5	0.7	0.7	A	
T-10202	T-10302	1CT:3CT	1.2	30	0.5	0.7	1.6	C	1-5
T-10203	T-10303	1:1	1.2	25	0.5	0.7	0.7	B	
T-10204	T-10304	1:1CT	0.06	23	.75	0.6	0.6	E	2-6
T-10205	T-10305	1CT:1	1.2	25	0.8	0.7	0.7	E	1-5
T-10206	T-10306	1:1.26CT	0.06	23	0.75	0.6	0.6	E	2-6
T-10210	T-10310	1CT:2CT	1.2	30	0.55	0.7	1.1	C	1-5
T-10211	T-10311	2CT:1CT	2.0	30	1.5	0.7	0.4	C	1-5
T-10212	T-10312	2.53CT:1	2.0	20	1.5	1.0	0.5	E	1-5
T-10213	T-10313	1:1.36	1.2	35	0.8	0.7	0.7	B	5-6
T-10214	T-10314	1:1:1	1.2	40	0.7	0.9	0.9	A	
T-10215	T-10315	1:2CT	1.2	40	0.5	0.7	1.1	E	2-6
T-10216	T-10316	1:2CT	2.0	40	0.5	0.7	1.4	E	2-6
T-10217	T-10317	1:4CT	0.5	40	1.0	0.5	1.5	D	1-5
T-10218	T-10318	1:1.14CT	1.2	35	0.8	0.7	0.8	D	1-5
T-10219	T-10319	1:0.575:0.575	1.5	25	0.8	0.7	0.5	A	5-6
T-10220	T-10320	1:1 / 1.26 ⁽³⁾	1.5	35	0.4	0.7	0.9	E	2-6 ⁽³⁾
T-10221	T-10321	1:0.5:0.5	1.5	25	1.2	0.7	0.5	A	5-6
T-10222	T-10322	1:0.633:0.633	1.5	20	1.1	0.7	0.5	A	5-6
T-10223	T-10323	1:2.3CT	1.2	35	0.8	0.7	1.15	D	1-5
T-10224	T-10324	1:1.36CT	1.2	35	0.8	0.7	0.9	D	1-5
T-10225	T-10325	1CT:1CT	1.2	25	0.8	0.8	0.8	C	
T-10226	T-10326	1:1.15CT	1.5	35	0.6	0.7	0.9	E	2-6
T-10227	T-10327	1CT:2CT	1.2	50	1.1	0.9	1.6	C	2-6
T-10228	T-10328	1:1	1.2	25	0.5	0.7	0.7	F	
T-10229	T-10329	1.37:1	1.2	35	0.8	0.8	0.7	F	1-5
T-10230	T-10330	1CT:1	1.2	35	0.5	0.8	0.8	H	1-5
T-10231	T-10331	1:1.36	1.2	35	0.8	0.8	0.8	F	1-5
T-10232	T-10332	1CT:2CT	1.2	35	0.8	0.8	1.8	G	1-5
T-10233	T-10333	1:1.15CT	1.2	35	0.5	0.8	0.8	H	2-6
T-10234	T-10334	1:1:1.266	1.2	35	0.8	0.8	0.8	A	1-2

- ET-Product of 10 V- μ sec min.
- OCL Measured across Primary @ 100 kHz & 20mV
- T-10220: Sec. = Pins 3-5 for 75 Ω , Sec. = Pins 1-5 for 120 Ω .



Physical Dimensions
inches (mm)



PT21

Data subject to change without notice.

Consult factory for other values & Custom Designs

T1 / CEPT / ISDN-PRI SMD 12 Pin Dual Transformers

See other T1/CEPT/ISDN-PRI products in this Catalog

For T1/CEPT Telecom Applications

Designed to meet CCITT and FCC Requirements

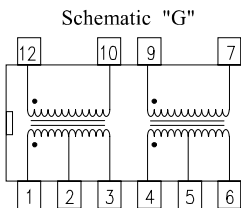
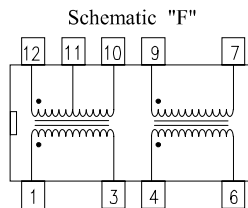
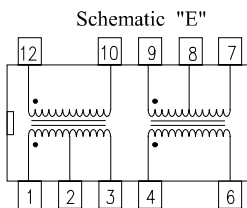
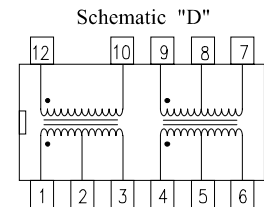
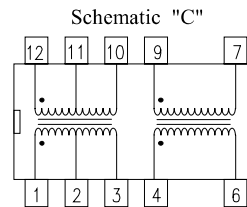
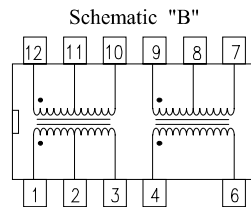
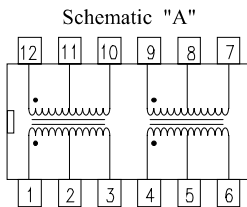
1500 VRMS Minimum Isolation

Refer to Table of Contents for a variety of other T1/CEPT/ISDN-PRI products

Electrical Specifications ^{1,2} at 25° C

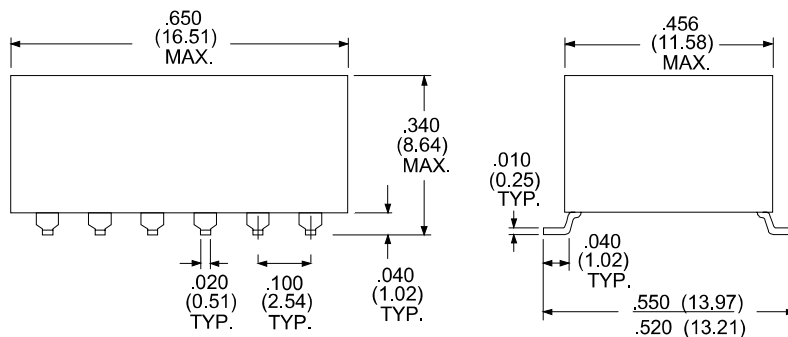
Part Number	Turns Ratio ± 5%	OCL Min. (mH)	C _{ww} max. (pF)	L _L max. (μH)	DCR Pri. max. (Ω)	DCR Sec. max. (Ω)	Schem. Style	Primary Pins
T-14400	1CT:2CT & 1CT:2CT	1.20 & 1.20	50 & 50	0.80 & 0.80	1.00 & 1.00	1.70 & 1.70	A	12-10, 4-6
T-14401	1CT:2CT & 1:1.36CT	1.60 & 1.60	60 & 50	1.00 & 0.80	1.70 & 1.70	2.00 & 1.70	B	12-10, 4-6
T-14402	1:1.15CT & 1CT:2CT	1.50 & 1.20	60 & 50	0.80 & 0.80	1.00 & 1.00	1.00 & 1.70	D	12-10, 4-6
T-14403	1:1/1.26 & 1CT:2CT	1.50 & 1.20	50 & 60	0.80 & 0.80	1.00 & 1.00	1.10 & 1.70	E	12-10, 4-6
T-14404	1:2CT & 2:1	1.60 & 1.60	55 & 40	1.30 & 1.30	1.10 & 1.10	1.10 & 0.70	F	1-3, 4-6
T-14405	1CT:1CT & 1CT:1CT	1.20 & 1.20	50 & 50	0.80 & 0.80	1.00 & 1.00	1.00 & 1.00	A	1-3, 4-6
T-14406	1CT:1.15CT & 1CT:1.15CT	1.20 & 1.20	50 & 50	0.80 & 0.80	1.20 & 1.20	1.40 & 1.40	A	1-3, 4-6
T-14407	1CT:1CT & 1CT:2CT	1.20 & 1.20	50 & 50	0.80 & 0.80	1.20 & 1.20	1.20 & 1.80	A	12-10, 4-6
T-14408	1CT:1.15CT & 1CT:1CT	1.50 & 1.50	60 & 60	0.80 & 0.80	1.00 & 1.00	1.10 & 1.00	A	12-10, 4-6
T-14409	1CT:1.36CT & 1CT:1.36CT	1.20 & 1.20	50 & 50	0.80 & 0.80	1.20 & 1.20	1.40 & 1.40	A	1-3, 4-6
T-14410	1CT:1.41CT & 1CT:1.41CT	0.80 & 0.80	30 & 30	0.80 & 0.80	1.00 & 1.20	1.00 & 1.20	A	12-10, 9-7
T-14411	1CT:2.3CT & 1CT:2CT	1.20 & 1.20	60 & 60	0.80 & 0.80	1.20 & 1.20	2.10 & 2.10	A	12-10, 4-6
T-14412	1CT:2CT & 1CT:2CT	1.20 & 1.20	31 & 31	.60 & .60	0.70 & 0.70	1.20 & 1.20	A	12-10, 4-6
T-14413	1CT:2CT & 1:1.36CT	1.20 & 1.20	32 & 37	.55 & .80	0.70 & 0.70	1.20 & 0.90	B	12-10, 4-6
T-14414	1:2CT & 1:1.14CT	1.20 & 1.20	40 & 35	.55 & .80	0.70 & 0.70	1.20 & 0.90	E	12-10, 4-6
T-14415	1CT:2CT & 1:1	1.20 & 1.20	30 & 30	.55 & .80	0.70 & 0.70	1.20 & 0.70	C	1-3, 4-6
T-14416	1:1.15CT & 1CT:2CT	1.20 & 1.20	35 & 35	.60 & .60	0.70 & 0.70	0.90 & 1.20	D	12-10, 4-6
T-14417	1:1/1.26 & 1:2CT	1.50 & 1.20	40 & 40	.40 & .50	0.70 & 0.70	0.90 & 1.20	E	12-10, 4-6
T-14418	1CT:2CT & 1:1.08CT	1.50 & 1.20	40 & 30	.60 & .60	0.70 & 0.70	1.10 & 0.70	B	12-10, 4-6
T-14419	1:1/1.26 & 1:1/1.26	1.50 & 1.50	45 & 45	.40 & .40	0.80 & 0.80	1.00 & 1.00	G	12-10, 9-7

1. ET-Product 10 V-μsec minimum.
2. OCL @ Pri., 100 mV & 100 kHz



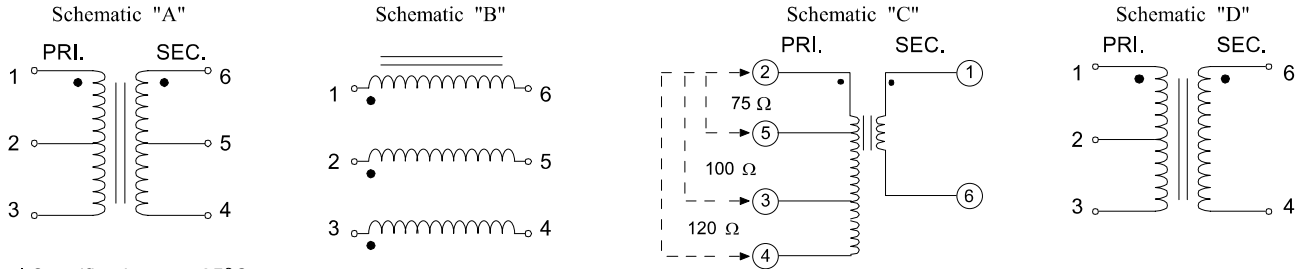
*PARTS SHIPPED IN
ANTI-STATIC TUBES*

*TAPE & REEL
AVAILABLE*



Transformers for T1 / CEPT / PCM Applications

Available in both Thru-hole & SMD EP7 Packages



Electrical Specifications at 25°C

Part Number (Hi-Pot)	Impedance (Ω)	Insertion Loss max. @ 772 kHz (dB)	Frequency Response (dB)	Return Loss min. (dB)	Longitudinal Balance min. (dB)	Primary DCR max. (Ω)	Secondary DCR max. (Ω)	Style & Schem.
T-13800 (1200 V _{RMS})	100 / 100	0.2 @ 772 kHz	± 0.10 100 kHz to 1.544 MHz	25 *	35 @ 1.544 MHz	1.0	1.0	EP7 - A
T-13801 (1500 VDC)	100 / 100 / 100	0.075 @ 772 kHz	± 0.25 100 kHz to 1.544 ** MHz	15 **	35 @ 1.544 MHz	0.6	0.6	EP7 - B
T-13802 (1650 VDC)	75-100-120 / 75	0.25 @ 772 kHz	± 0.15 100 kHz to 1.544 MHz	20 ***	40 @ 1.0 MHz	1.55	1.15	EP7 - C

* 100 kHz to 1.544 MHz 100 Ω

** 100 kHz to 4.0 MHz 100 Ω

*** 50 kHz to 3.0 MHz 75 Ω Secondary 75 Ω, 100 Ω or 120 Ω Primary

Surface Mount Versions of all Parts listed are available.

Add suffix "G" to specify surface mount package style.

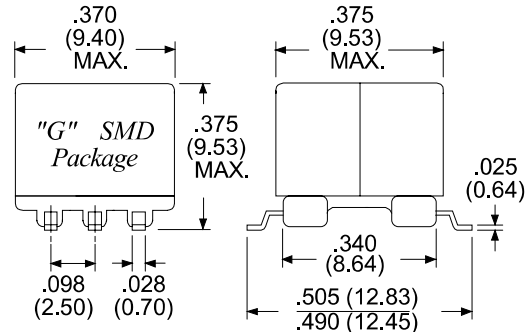
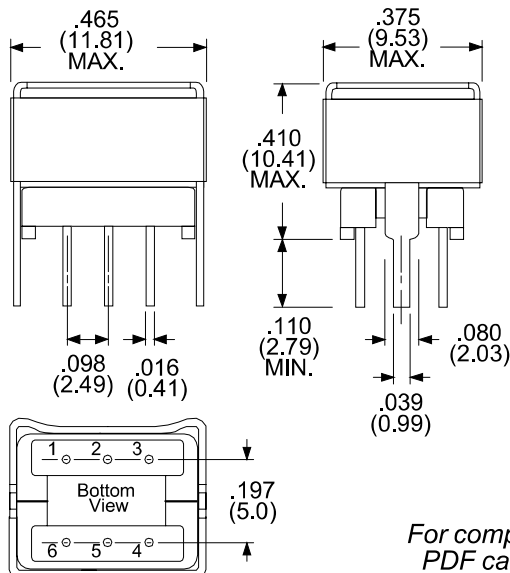
Electrical Specifications ^{1,2,3} at 25°C

Part Number	Turns Ratio (± 5 %)	OCL min. (mH)	PRI-SEC C _{w/w} max. (pF)	Leakage Ind. max. (μH)	Primary DCR max. (Ω)	Secondary DCR max. (Ω)	Style & Schem.	Primary Pins
T-13803	1CT : 1	1.2	35	1.0	0.9	0.9	EP7 - D	1-3
T-13804	1CT : 0.86	1.5	35	1.0	0.65	1.4	EP7 - D	1-3
T-13805	2CT : 1	1.2	50	1.0	1.1	0.7	EP7 - D	1-3

1. 1000 V_{RMS} minimum Isolation.

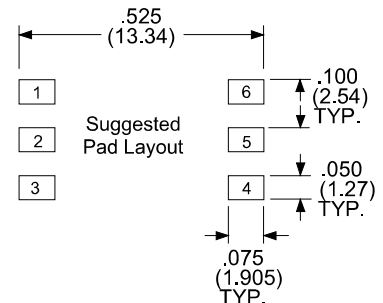
2. ET-Product of 10 V-msec min.

3. OCL Measured at Primary @100KHz & 20mV



Part Number Examples:

T-13800 (EP7 Thru-hole)
T-13800G (EP7 SMD)
T-13803 (EP7 Thru-hole)
T-13803G (EP7 SMD)



For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

PT21

T1 / CEPT / ISDN-PRI Reinforced Insulation

For T1/CEPT/ISDN-PRI Telecom Applications
Designed to meet CCITT and FCC Requirements

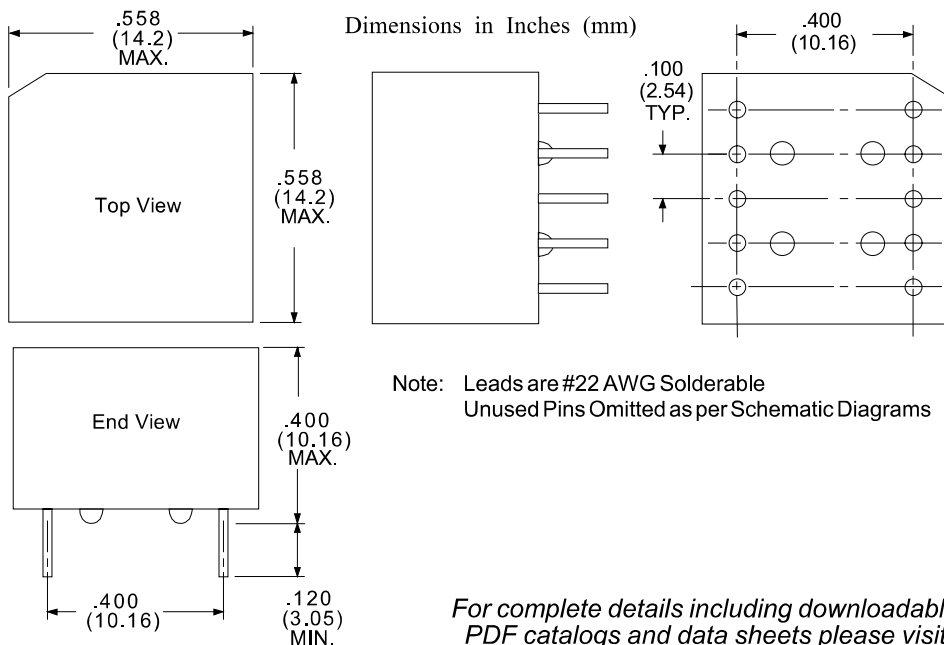
Reinforced Insulation per EN 41003/EN 60950

3000 V_{RMS} minimum Isolation.

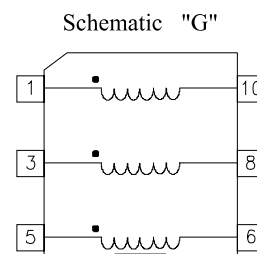
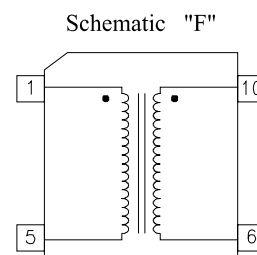
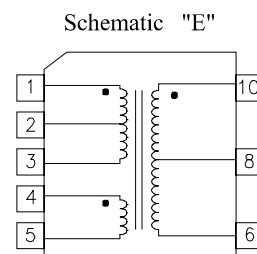
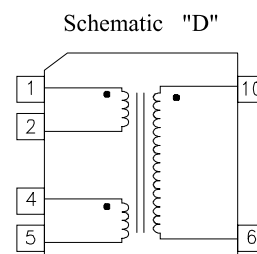
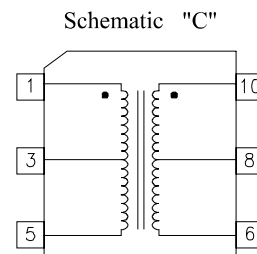
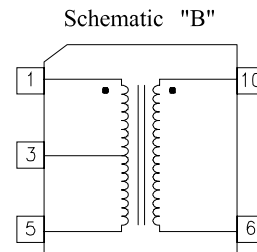
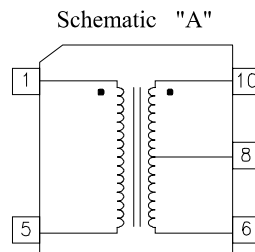
Electrical Specifications^{1,2} at 25°C

Part Number	Turns Ratio (± 5%)	OCL min. (mH)	Pri-Sec C _{w/w} max. (pF)	Leakage L _l max. (μH)	Pri. DCR max. (Ω)	Sec. DCR max. (Ω)	Schem. Style	Primary Pins
T-13611	1:1:2	0.8	25	0.80	0.7	0.7	D	1-5 ⁽³⁾
T-13612	1CT:2CT	1.2	30	0.55	0.7	1.1	C	1-5
T-13613	1:1	1.2	30	0.80	0.7	0.7	F	1-5
T-13614	1CT:2CT	1.2	30	0.55	0.7	1.1	C	1-5
T-13615	1CT:3CT:1	0.6	30	0.80	0.7	1.7	E	1-3
T-13616	1:1.08/1.36	1.5	20	0.60	0.7	0.9	B	10-6
T-13617	1:1.14CT	1.5	30	0.70	0.7	0.9	B	10-6
T-13618	1:1:1.58	0.8	18	0.70	0.7	0.5	D	1-5 ⁽³⁾
T-13619	1:1:1	1.2	50	1.20	1.1	1.1	G	
T-13620	1CT:1	1.2	25	0.8	0.7	0.7	B	1-5
T-13621	1CT:2CT	1.2	30	0.55	0.7	1.1	C	10-6
T-13623	1:2CT	1.2	40	0.5	0.7	1.1	A	1-5
T-13624	1:2.3CT	1.2	35	0.8	0.7	1.15	A	1-5
T-13633	1:1/1.26	1.5	35	0.60	0.7	1.1	B	10-6
T-13634	1:1.58/2	1.5	20	0.70	0.7	1.2	B	10-6
T-13635	1:1.36CT	1.2	35	0.60	0.7	0.9	B	10-6

- All Transformers have ET-Product of 10 V-μsec min.
- OCL Measured at Primary @100KHz & 20mV
- For Schematic D, Primary measured with Pins 2 & 4 shorted.



For complete details including downloadable PDF catalogs and data sheets please visit
www.rhombus-ind.com



PT21

T1/E1 Common Mode Chokes

6-Pin or 40-Pin Surface Mount Module
Designed for Quad Port Applications

Common Mode Attenuation from
100kHz to 500MHz

Operating Temperature Range: 0 °C to +70 °C

Parts shipped in anti-static tubes

Tape & Reel Available upon request

Electrical Specifications at 25° C

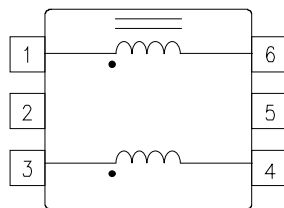
Part Number	Pri. Ind. OCL, Min. (μH)	DCR Max. (Ω)	Hi-Pot Min. V _{RMS}	Common Mode Attenuation (dB)							
				100k	1M	10M	30M	50M	100M	300M	500M
F-1900	47	0.3	2000	3	20	33	37	35	27	9	4
F-1921	47	0.3	500	3	20	33	37	35	27	9	4

Designed to meet Bellcore GR-1089 for Surge Voltage Capability

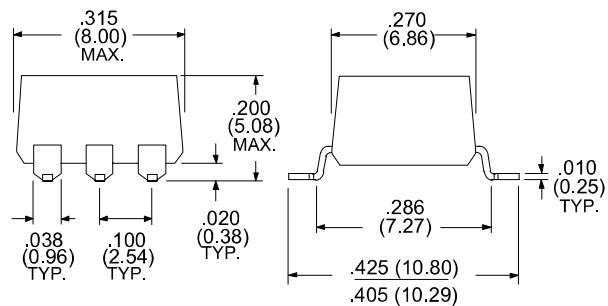
Metallic Voltage: 800 V peak, 10/560 μS

Longitudinal Voltage: 2400 V peak, 10/700 μS

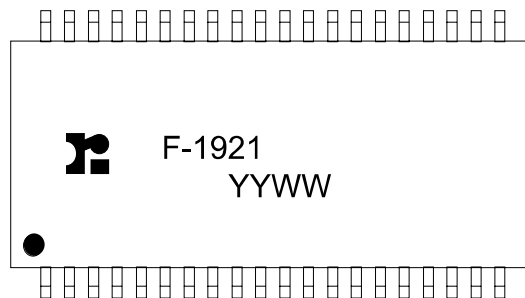
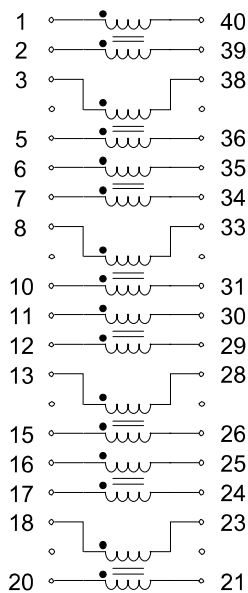
P/N F-1900
Schematic Diagram



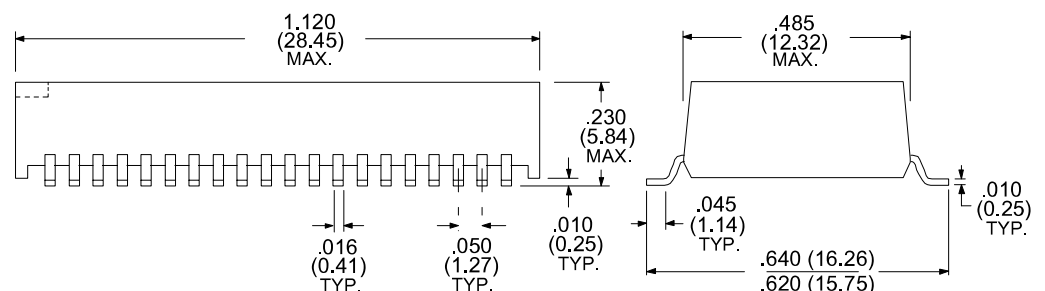
6-Pin SMD: P/N F-1900



P/N F-1921
Schematic Diagram



40-Pin 50-mil
SMD Package



For complete details including downloadable PDF catalogs and data sheets please visit

www.rhombus-ind.com

T3 Interface Transformers

For T3, DS3, E3 & STS-1 Interfaces

Complies with CCITT G.703

Matched to Leading I.C. Manufacturers

Isolation 1500V_{RMS} minimum

Rise Times Compatible with Standards

Available in SMD & Thru-hole packages

Operating Temp. Range: -40°C to +85°C

I.C. / Transformer Cross Reference

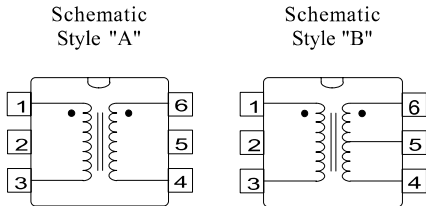
I.C. Manuf. Name	I.C. Part Number	Single Configuration - SMD		Single Configuration - DIP	
		Transmit	Receive	Transmit	Receive
AT&T	T7296	T-13100	--	T-13103	--
Exar	XR-T7296	T-13100	--	T-13103	--
Silicon Sys.	SSI 78P236 DS3	T-13101	T-13100	T-13102	T-13103
Silicon Sys.	SSI 78P7200 DS3	T-13101	T-13100	T-13102	T-13103
Silicon Sys.	SSI 78P2361 STS1	T-13101	T-13100	T-13102	T-13103
Silicon Sys.	SSI 78P2362 E3	T-13101	T-13100	T-13102	T-13103
Transwitch	MRT, TXC-02050 E3	T-13101	T-13100	T-13102	T-13103
Transwitch	MRT, TXC-02020 DS3/STS1	T-13100	T-13100	T-13103	T-13103

Electrical Specifications at 25°C

Part (1) Number	Turns Ratio	OCL min. (μH)	L ₁ max. Sec. (μH)	Cw/w max. (pF)	Package	Schem. Style	Primary Pins
T-13100	1:1	40	0.14	15	6 Pin SMD	A	1-3
T-13101	1:2CT	19	0.14	15	6 Pin SMD	B	1-3
T-13102	1:2CT	19	0.14	15	6 Pin Dip	B	1-3
T-13103	1:1	40	0.14	15	6 Pin Dip	A	1-3
T-13104	1:2CT	40	0.14	15	6 Pin SMD	B	1-3
T-13105	1:1	45	0.12	13	6 Pin SMD	A	1-3
T-13107	1:1.73CT	50	0.10	12	6 Pin Dip	B	1-3
T-13108(G) (2)	1:1	40	0.10	5	T6 Dip or SMD	F	1-5
T-13109(G) (2)	1:2CT	19	0.06	10	T6 Dip or SMD	G	1-5
T-15100	1:1&1:1	40	0.14	15	16-Pin SMD	E	1-3/9-11
T-15101	1:2CT&1:2CT	19	0.14	15	16-Pin SMD	C	14-16/6-8
T-15102	1:2CT&1:1	19/40	0.14	15	16-Pin SMD	D	14-16/6-8

1. The 3 dB Bandwidth is 200kHz - 280MHz typical, tested in a 75 ohm system.

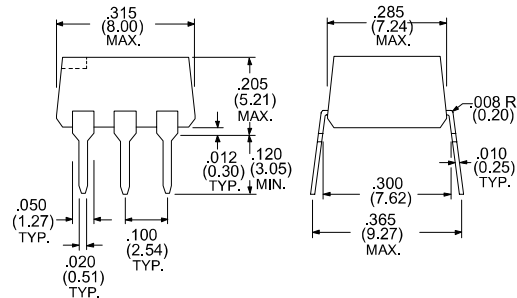
2. Reinforced Insulation (3000 V_{RMS})



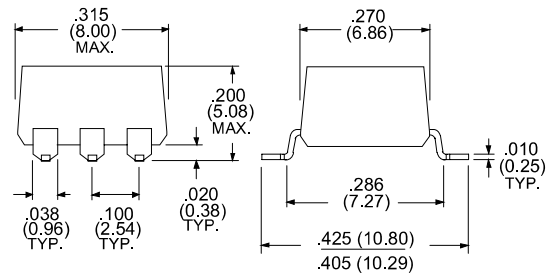
For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

Dimensions in Inches (mm)

6-Pin DIP: T-13102 & T-13103



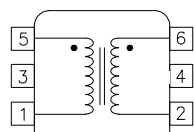
6-Pin SMD:
T-13100
T-13101
T-13104
& T-13105



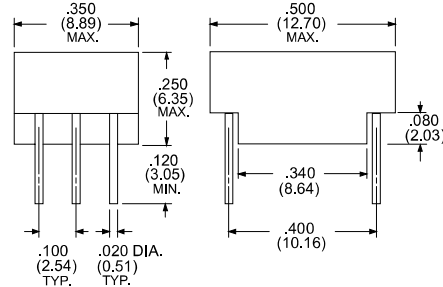
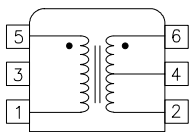
SMD versions available on Tape & Reel

T6: T-13108 & T-13109

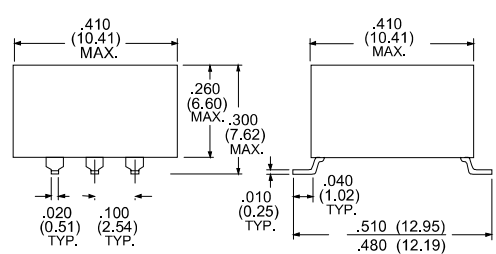
Schematic "F"
T-13108



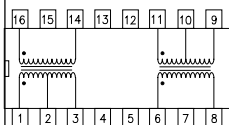
Schematic "G"
T-13109



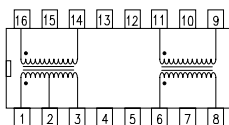
G6: T-13108G & T-13109G



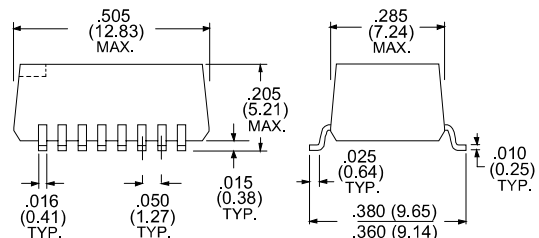
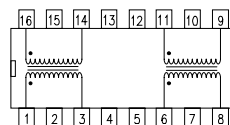
Schematic "C"
P/N T-15101



Schematic "D"
P/N T-15102



Schematic "E"
P/N T-15100



PT21

ISDN S-Interface Transformers

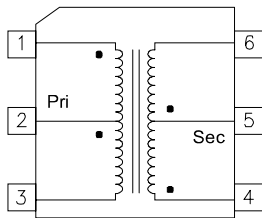
Meets the Pulse Waveform Template of CCITT I.430 when recommended Transformer and Chip pair are used.

Excellent Longitudinal Balance $2kV_{RMS}$ & $4kV_{RMS}$ min. Isolation

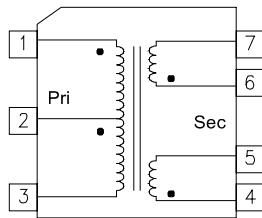
Electrical Specifications ^{1,2,3,4} at 25°C

Isolation (Min.)		Turns Ratio (± 2%)	OCL min. Pri (mH)	L _L max. Sec. (μH)	C _{www} max. (pF)	CD pri. max. (pF)	DCR Pri. ± 15% (Ω)	DCR Sec. ± 15% (Ω)	Schem. Style
2000 V _{RMS} Part. No.	4000 V _{RMS} Part. No.								
T-10400	T-10450	1:1	22	5	100	40	2.4	2.4	A
T-10401	T-10451	1:1.8	22	15	100	140	2.5	4.2	B
T-10402	T-10452	1:2	22	15	100	80	2.3	4.0	A
T-10403	T-10453	1:2.5	22	30	100	150	2.5	5.8	B
T-10404	T-10454	1:2.5	22	15 / 40	100	110	2.5	5.8	C
T-10405	T-10455	1:2	22	11	100	180	2.5	5.0	A

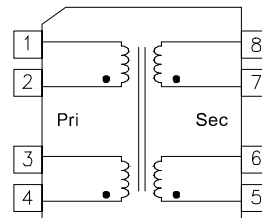
Schematic "A"



Schematic "B"

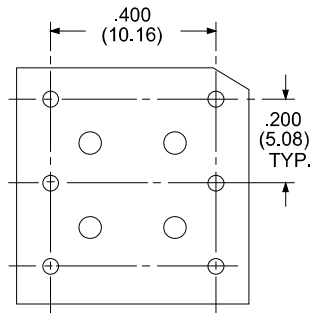


Schematic "C"

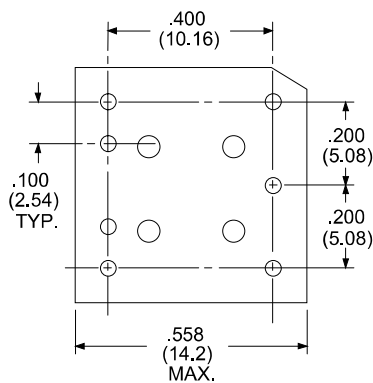


1. Primary is Line Side
2. OCL: Primary Inductance @10 kHz and 700 mV
3. Unbalanced current at TE: Δ I_{dc} = 1 mA max.
4. Longitudinal Conversion Loss 10KHz to 300 KHz 60dB min.

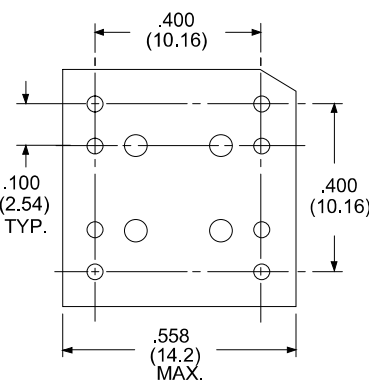
6-Pin Bottom View



7-Pin Bottom View

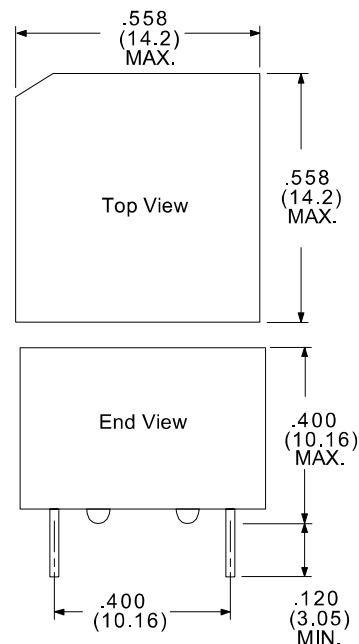


8-Pin Bottom View



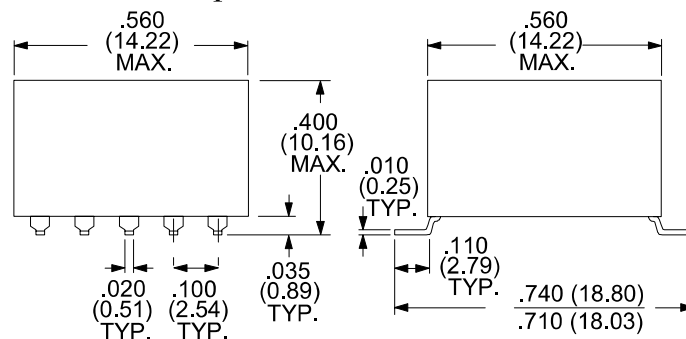
Available as Surface Mount components:
For Surface Mount part number replace the second digit of thru hole part number with "3".
(i.e. T-10400 = T-13400)

Note: Leads are #22 AWG Solderable
Unused Pins Omitted as per Schematic Diagrams



Surface Mount Package, T-134XX

Tape and Reel Available



For complete details including downloadable PDF catalogs and data sheets please visit

www.rhombus-ind.com

ISDN S-Interface Transformers

Dual - Transmit / Receive

Meets the Pulse Waveform Template of CCITT I.430 when recommended Transformer & Chip pair are used.

Excellent Longitudinal Balance

2000V & 4000V RMS min. Isolation Versions

For complete details including downloadable PDF catalogs and data sheets please visit

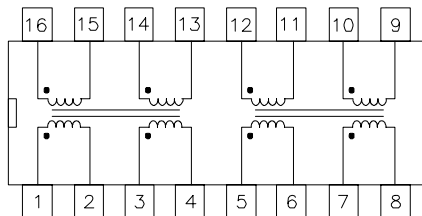
www.rhombus-ind.com

Electrical Specifications ^(3,4) at 25°C

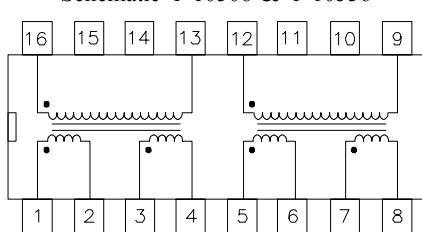
4000V _{RMS} Isolation SMD P/N	2000V _{RMS} Isolation SMD P/N	Transmit Receive	Ratio (± 2%)	OCL ^(1,2) Pri. min. (mH)	L _L Sec. max. (μH)	Cw/w max. (pF)	CD pri max. (pF)	DCR pri ± 15% (Ω)	DCR sec ± 15% (Ω)
T-10550	T-10500	T R	1:2 1:1	22 22	15 5	100 100	80 40	2.3 2.4	4.0 2.4
T-10551	T-10501	T R	1:1 1:1	22 22	5 5	100 100	40 40	2.4 2.4	2.4 2.4
T-10552	T-10502	T R	1:1.8 1:2.5	22 22	15 30	100 100	140 150	2.5 2.5	4.2 5.8
T-10553	T-10503	T R	1:2 1:2	22 22	15 15	100 100	80 80	2.3 2.3	4.0 4.0
T-10554	T-10504	T R	1:2.5 1:2.5	22 22	15 - 40 15 - 40	100 100	110 110	2.5 2.5	5.8 5.8
T-10555	T-10505	T R	1:2 1:2	22 22	11 11	100 100	180 180	2.5 2.5	5.0 5.0
T-10556	T-10506 (2400V _{RMS} Isolation)	T R	1:2.5 1:2.5	22 22	4 4	100 100	100 100	2.3 max. 2.3 max.	5.8 max. 5.8 max.

- 1) Primary is Line Side
- 2) OCL @10 KHz and 700 mV, except T-10506, T-10556 voltage is 500mV
- 3) Unbalanced current at TE: Δ I_{dc} = 1 mA max.
- 4) Longitudinal Conversion Loss: 10 kHz to 300 kHz is 60dB min.

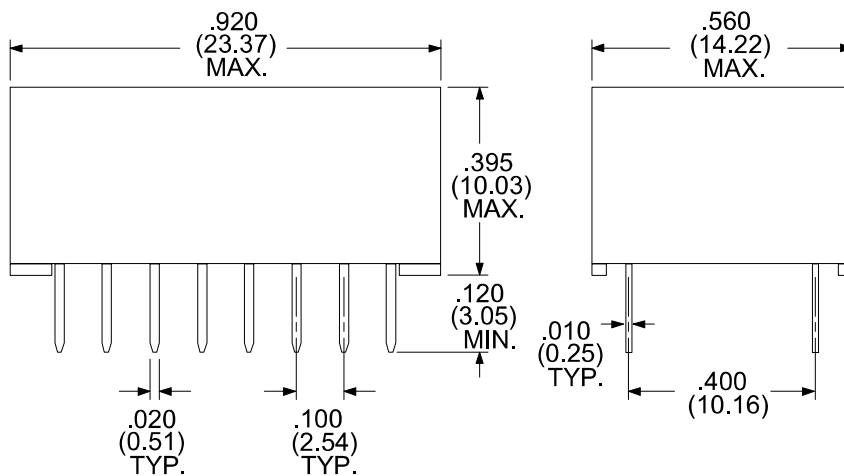
Schematic T-10500 thru T-10505 and T-10550 thru T-10555



Schematic T-10506 & T-10556

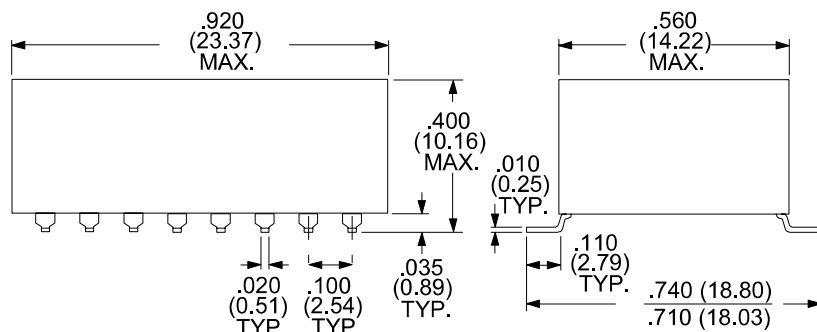


Available as Surface Mount:
For SMD P/N replace the "T-10..." of thru hole P/N with "T-13..."
Example: T-10500 = T-13500



Package Dimensions in Inches (mm)

Surface Mount Package, T-135XX Tape & Reel Available



PT21

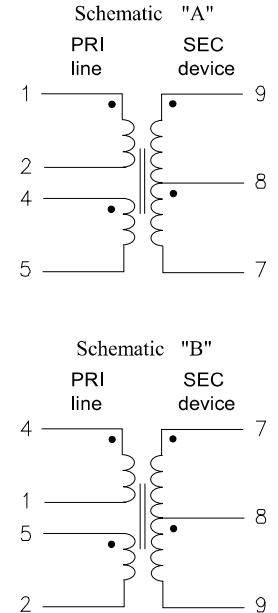
ISDN U-Interface Transformers

For both 2B1Q & 4B3T ISDN U-Interface Applications
 Excellent Longitudinal Balance
 Designed for use with leading Transceiver Chips
 Meets key parameters of ANSI T1.601-1992
 Isolation 2000 V_{RMS} & 3000 V_{RMS} Minimum
 Surface Mount Versions Available

Manufacturer Name	I.C. P/N	Transformer P/N	High Isolation P/N
Motorola	MC145472	T-13209	T-13223
Motorola	MC145572	T-13207	T-13221
National	TP 3410	T-13211	T-13224
National	TP 3410	T-13212	T-13220
Siemens	PEB 2091	T-13214	T-13222
Siemens	PEB 2090/20901	T-13215	T-13225
SGS-Thomson	SD 5411	T-13210	T-13219

Electrical Specifications at 25°C

Part Number	Turns Ratio (± 3 %)	OCL ^(1,3) Pri ±6% (mH)	Line Side Pins	DCR ⁽¹⁾ max. (Ω)	DCR ⁽²⁾ max. (Ω)	DC Bias (mA)	Coding	Isolation (V _{RMS})	Schem. Style ⁽³⁾
T-13207	1.25:1	28.0	(1-5)	12	8	80	2B1Q	2000	A
T-13209	2.00:1	27.0	(1-5)	11.6	6.4	60	2B1Q	2000	A
T-13210	1.50:1	15.0	(4-2)	16	2.5	60	2B1Q	2000	B
T-13211	1.50:1	27.0	(4-2)	20	3.0	60	2B1Q	2000	B
T-13212	1.50:1	27.0	(1-5)	20	3.0	60	2B1Q	2000	A
T-13214	1.65:1	15.5	(1-5)	6.0	3.5	60	2B1Q	2000	A
T-13215	1.32:1	7.7	(1-5)	2.4	2.7	60	4B3T	2000	A
T-13219	1.50:1	15.0	(4-2)	18	3.0	60	2B1Q	3000	B
T-13220	1.50:1	27.0	(1-5)	20	3.0	60	2B1Q	3000	A
T-13221	1.25:1	25.5	(1-5)	13	9.0	80	2B1Q	3000	A
T-13222	1.65:1	15.5	(1-5)	6.0	3.5	60	2B1Q	3000	A
T-13223	2.00:1	27.0	(1-5)	12.6	7.4	60	2B1Q	3000	A
T-13224	1.50:1	27.0	(4-2)	20	3.0	60	2B1Q	3000	B
T-13225	1.32:1	7.7	(1-5)	2.7	3.0	60	4B3T	3000	A



- Line Side.
- Device Side
- OCL Tested @10 kHz / 700 mV, pins 2&4 shorted for Schem. "A"; pins 1&5 shorted for Schem. "B."
- For all parts unused Pin # 6 can be removed for keying to printed circuit board, Add suffix "-9"

Longitudinal Balance (2B1Q Coding)
 281 Hz to 40 KHz 55 dB min.
 > 40 KHz -20 dB/decade

Longitudinal Balance (4B3T Coding)
 5 KHz 20 dB min.
 20 KHz to 150 KHz 40 dB min.
 1 MHz 36 dB min.

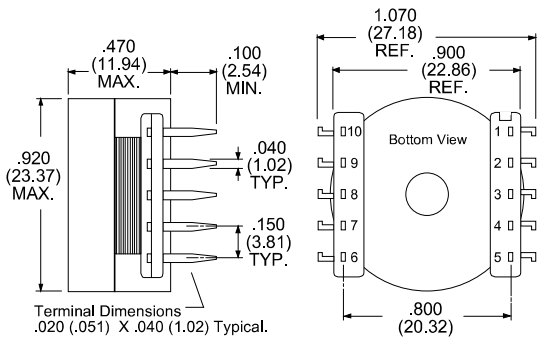
Return Loss
 10 and 25 KHz 20 dB min.

Operating Temp. Range -40°C to +85°C

Primary is Line Side / Secondary is Chip Side

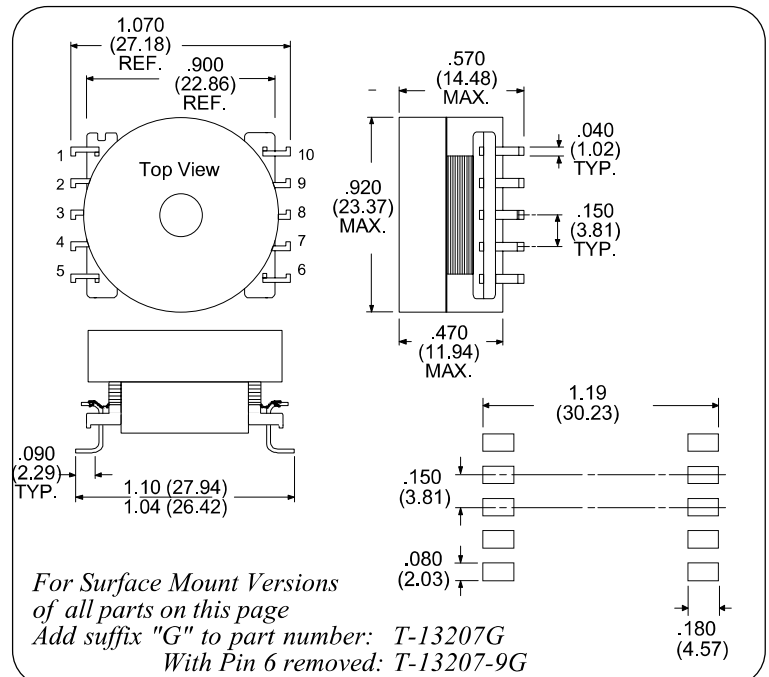
Surge Voltage Capability:
 Metallic Voltage: 800 V peak, 10/700 μS
 Longitudinal Voltage: 2400 V peak, 10/560 μS

Package Physical Dimensions in inches (mm)



Termination Numbers for Reference Only.

For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com



For Surface Mount Versions of all parts on this page Add suffix "G" to part number: T-13207G With Pin 6 removed: T-13207-9G

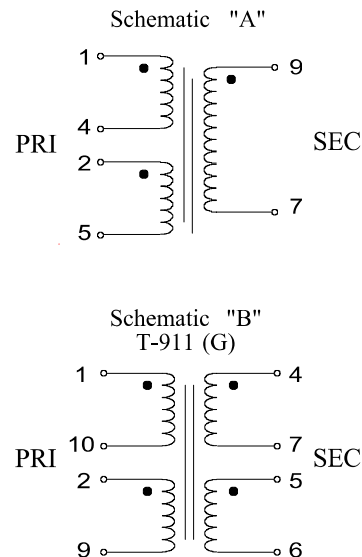
HDSL Line Interface Transformers

Thru-hole & Surface Mount Versions

Manufacturer Name	I.C. Part #	Bit Rate	Transformer Part #
Brooktree	BT8921	784	T-982
Brooktree	BT8921	1168	T-976
Brooktree	BT8960	160	T-984
Brooktree	BT8960	288	T-940
Brooktree	BT8960	416	T-983
Brooktree	BT8970	784	T-982
Brooktree	BT8970	1168	T-976

Electrical Specifications at 25°C

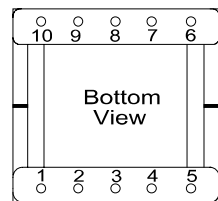
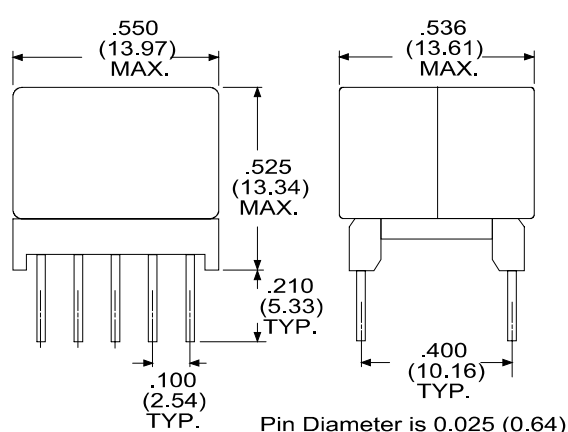
P/N (Thru-hole) P/N (SMD)	T-911 T-911G	T-940 T-940G	T-976 T-976G	T-982 T-982G	T-983 T-983G	T-984 T-984G	Units Units
Turns Ratio	1:1	2:1	2:1	2:1	2:1	2:1	
Inductance	3	5	2	3	3.5	8	mH
DC Resistance Pri	3.8	3.5	2.5	2.5	2.5	4.0	Ω
DC Resistance Sec	3.8	2.2	1.0	1.0	1.0	2.3	Ω
Frequency Response	0.1	0.07	0.1	0.7	0.1	0.1	dB
Insertion Loss	0.5	0.43	0.5	0.4	0.5	0.5	dB
D.C. Current	100	100	160	160	60	60	mA
Longitudinal Balance	50	53	50	53	53	53	dB
Return Loss	17	17	16.5	20	17	16	dB
Harmonic Distortion	-70	-70	-70	-70	-70	-70	dB
Isolation	1000	1500	1500	1500	1500	1500	V _{RMS}
Schematic Style	B	A	A	A	A	A	



Request Individual Data Sheets for test conditions & additional information

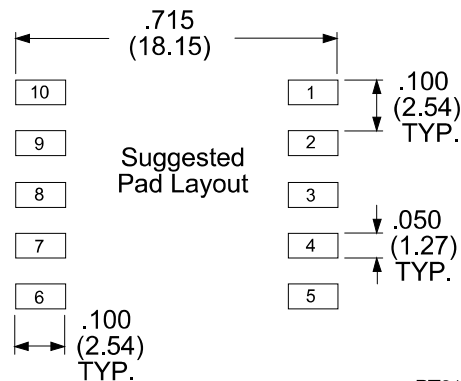
Standard Thru-hole EP-13 Package

Surface Mount Versions of all Parts listed are available.
Add suffix "G" to specify surface mount package style.



Physical Dimensions
inches (mm)

For complete details including
downloadable PDF catalogs
and data sheets please visit
www.rhombus-ind.com



HDSL Line Interface Transformers

Available in Thru-hole and Surface Mount Versions

Operating Temperature
Range -40°C to +85°C

Primary is Line Side
Secondary is Chip Side

Surge Voltage Capability

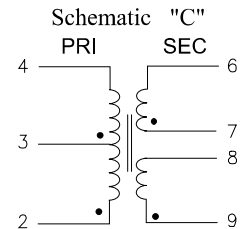
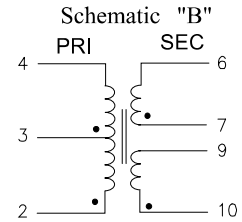
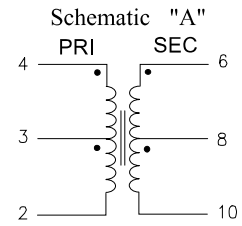
Metallic
Voltage: 800 V peak, 10/700 μ S

Longitudinal
Voltage: 2400 V peak, 10/560 μ S

Manufacturer Name	I.C. P / N	Bit Rate	Transformer P / N
Brooktree	BT8921	784	T-882
Brooktree	BT8921	1168	T-883
Brooktree	BT8952	784	T-718
Brooktree	BT8952	1168	T-717
Level One	SK7074	784	T-977
Level One	SK7074	1168	T-848

Electrical Specifications at 25°C

Parameter	T-977	T-848	T-718	T-717	T-882	T-883	Units
Turns Ratio ⁽¹⁾	1:1.8	1:1.8	2:1:1	2:1:1	1:1:1	1:1:1	
Inductance ⁽²⁾	2.75	2.06	3.00	2.00	3.00	2.00	mH
DC Resistance Pri	3.0	2.0	2.2	2.2	2.2	2.2	Ω
DC Resistance Sec	3.2	2.0	4.4	4.4	2.2	2.2	Ω
D.C. Current	75	75	160	160	70	70	mA
Longitudinal Balance	50	50	55	55	55	55	dB
Return Loss	20.0	16.5	20.0	16.5	20.0	16.5	dB
Harmonic Distortion	-75	-75	-75	-75	-75	-75	dB
Isolation	2000	2500	1500	1500	1500	1500	V _{RMS}
Schematic Style	A	B	C	C	C	C	



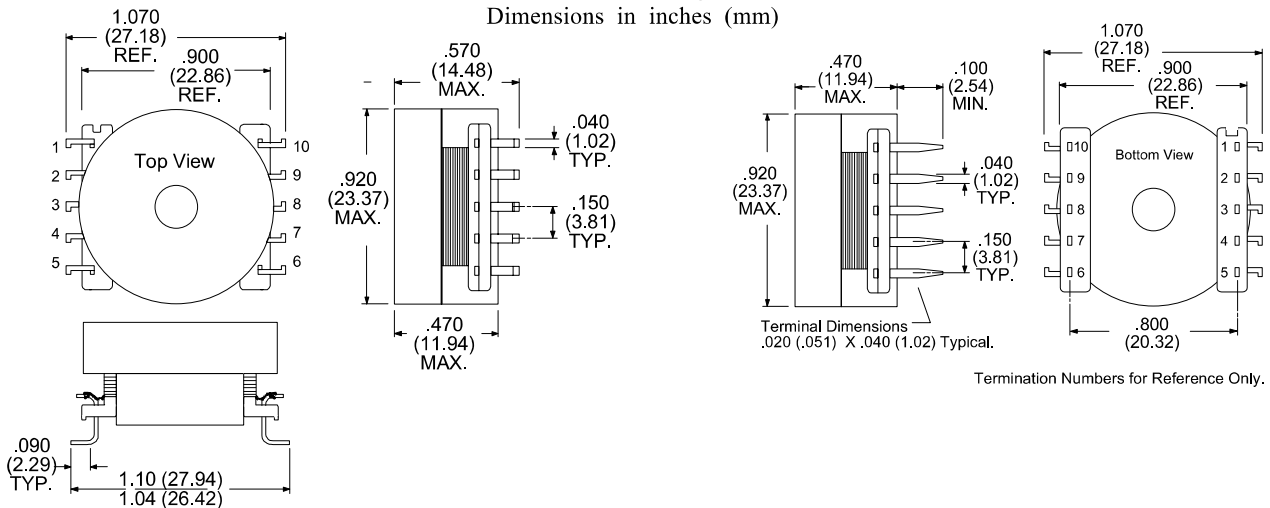
1. Chip Side (Primary) to Line side (Secondary)
2. Line side
3. For all parts, unused Pin # 5 can be removed for keying to printed circuit board. **Add suffix "-9"**

Part Number Examples:

T-977 10-Pin Thru-hole
 T-977-9 Thru-hole, Pin 5 Removed
 T-977G 10-Pin SMD
 T-977-9G SMD, Pin 5 Removed

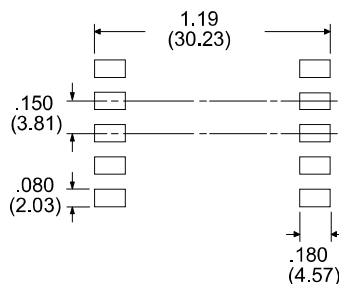
Refer to Individual Data Sheets for test conditions & additional information

RS2311 Package
Dimensions in inches (mm)



Termination Numbers for Reference Only.

For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com



HDSL2 Transformer

Designed for HDSL2 applications

Compatible with Level One
SK70740/41/42

Low Profile "Touch Tone" design

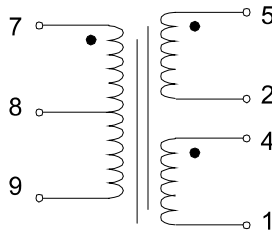
Operating Temp. Range -40°C to +85°C

Surge Voltage Capability:

Metallic Voltage: 800V peak, 10/700 μS

Longitudinal Voltage: 2400V peak, 10/560 μS

Schematic
Diagram



Line Side Pins 7 - 9

Chip Side Pins 5 - 2, 4 - 1

Primary is Line Side

Secondary is Chip Side

Parameter -- P/N T-1316 & T-1316G	Units
Turns Ratio ⁽¹⁾	1 : 2 ± 3%
Inductance ⁽²⁾	1.75 ± 8% mH
Longitudinal Balance, 20 kHz to 600 kHz	50 min. dB
Primary DCR (Pins 7-9)	0.6 Max. Ω
Secondary DCR (Pins 5-2 or 4-1)	0.6 Max. Ω
Frequency Response, 40kHz - 300kHz	± 0.2 dB
Insertion Loss @ 100kHz	0.3 dB
Isolation (HI-POT)	3000 V _{RMS}
Primary DC	160 mA
Return Loss @ 100kHz	16.5 min. dB
THD, (10 KHz, 4.95V _{RMS})	-75 Min. dB

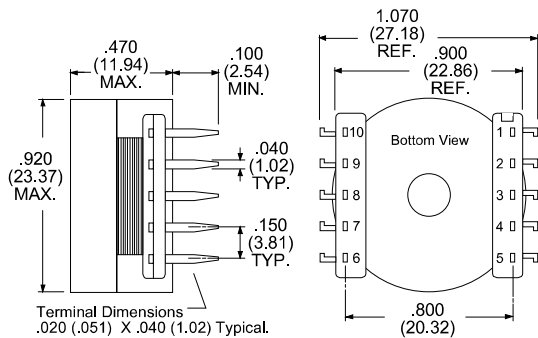
1. Short pins 2 & 4

2. Line Side, Pins (7 - 9) @ 10KHz and 100 mV

For complete details including downloadable
PDF catalogs and data sheets please visit

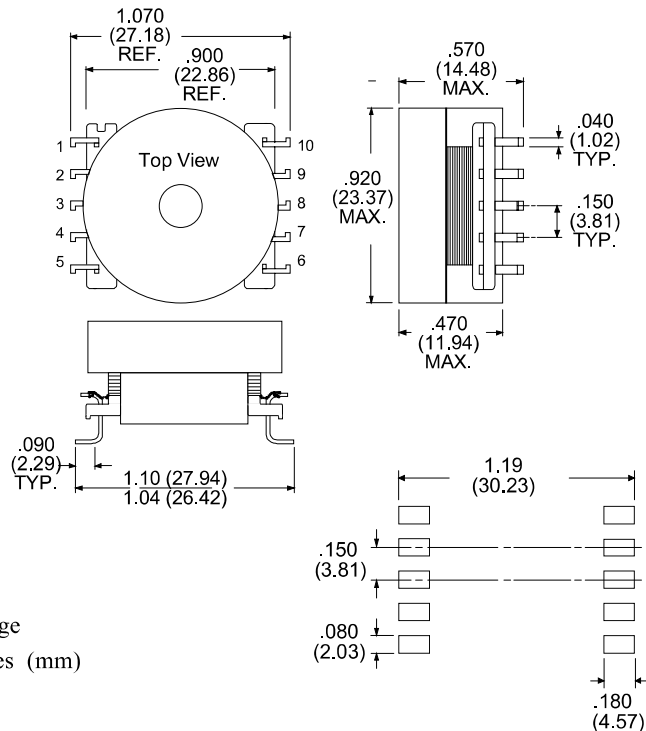
www.rhombus-ind.com

Part Number T-1316



Notch on bobbin indicates pin #1

SMD Part Number T-1316G



RS2311 Package
Dimensions in inches (mm)

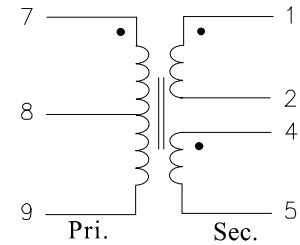
PT21

ADSL Line Interface Transformers

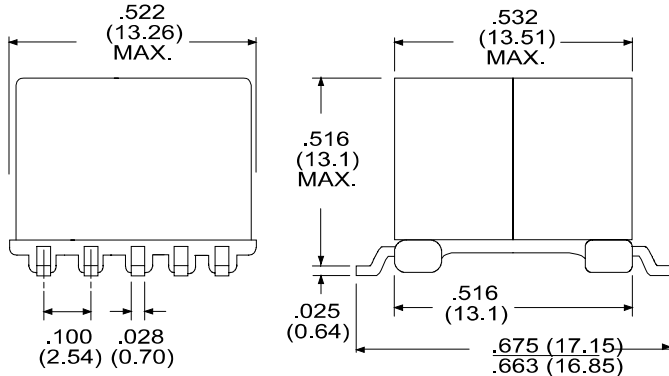
Electrical Specifications at 25°C

P/N (EP13 Type, SMD)	T-1115G	T-1116G	T-1117G	T-1118G	T-1119G	Units
Turns Ratio $\pm 2\%$ (Pins 7-9 : 1-5)	1:2.24	1:1.2	1.8:1	1:1	1:1	
Inductance $\pm 7\%$ Device Side (Pri.)	0.36	1.25	5.83	1.8	0.37	mH
Leakage Inductance	13	13	20	20	11	μ H
DC Resistance Pri.	0.3	1.2	8.0	1.0	2.2	Ω
DC Resistance Sec.	0.8	1.3	1.3	1.3	1.8	Ω
Longitudinal Balance (Min)	50	50	50	50	50	dB
Isolation (Min.)	1500	1500	1500	1500	1500	V _{RMS}

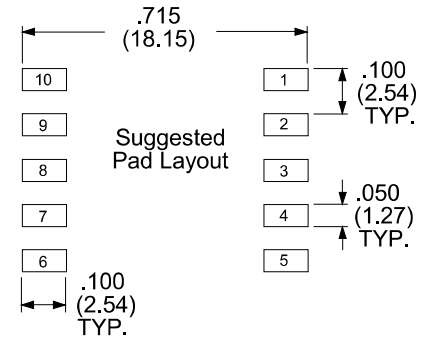
Schematic for T-1115 / -1119



Thru-hole Versions Available,
refer to package on page 16
(remove "G" from P/N)



Dimensions
in Inches (mm)



DSL Transformer

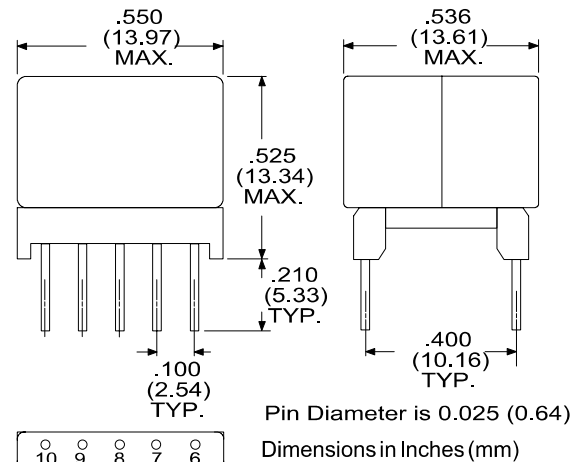
Designed to meet the supplementary insulation requirements of UL1950 for a working voltage of 250V

Materials used in construction of this component meet or exceed UL Class B and can be operated up to 130°C

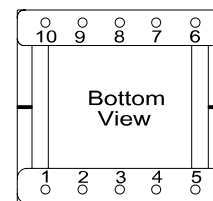
P/N T-1328: Turns Ratio		1 : 1			
Parameter	Min.	Typ.	Max.	Units	
Inductance ¹ 1-4 (Tie 2+3)	387.1	407.5	427.8	μ H	
Leakage Inductance ² 1-4 (Tie 2+3, 8+9, 10+7)			10	μ H	
Interwinding Capacitance ³			25	pF	
DC Resistance 1-3 or 2-4			0.72	Ω	
DC Resistance 10-8 or 9-7			0.61	Ω	
Frequency Response 30k-2MHz			3.0	dB	
Longitudinal Balance 20k-1MHz		55		dB	
Hi-Pot Primary to Secondary	1875			V _{RMS}	
Impedance 100 Ω Pri. with 100 Ω Sec					
Total Harmonic Distortion: 85 dB Min. 100kHz, 15Vp-p drive signal at PRI					

- 10kHz and 100mV
- 100kHz and 100mV
- 10kHz and 1V

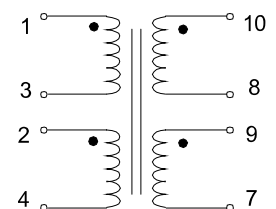
For complete details including downloadable
PDF catalogs and data sheets please visit
www.rhombus-ind.com



Pin Diameter is 0.025 (0.64)
Dimensions in Inches (mm)



Schematic Diagram
P/N T-1328



Ethernet Transformers

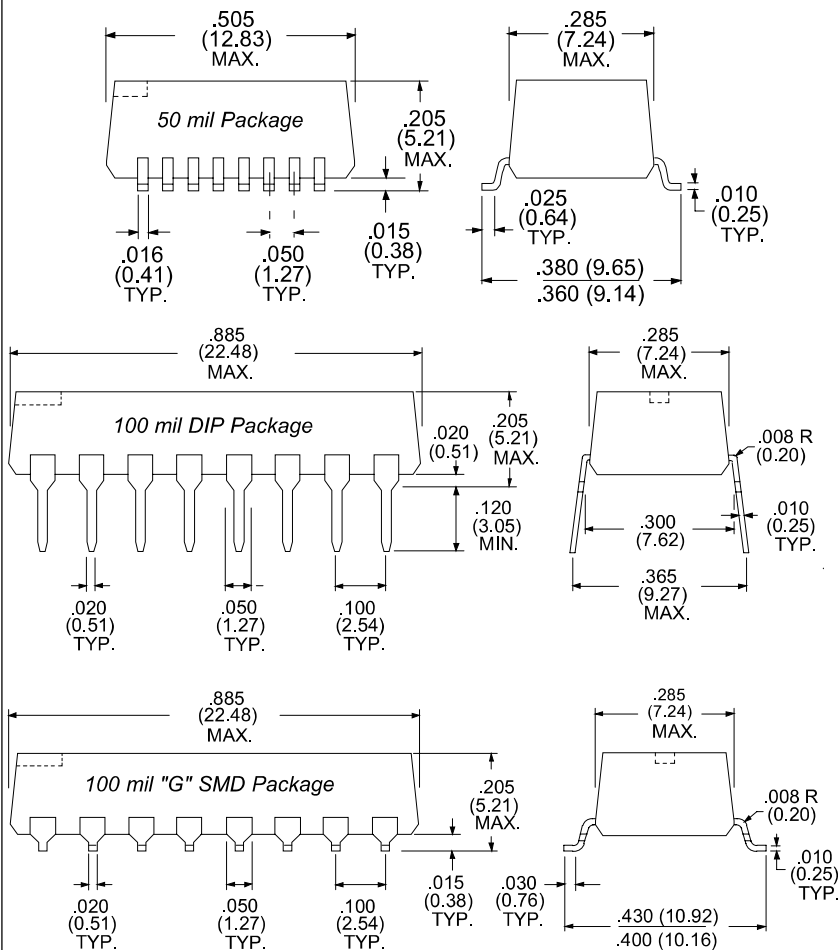
Triple & Quad Packages

IEEE 802.3 (10 BASE 2, 10 BASE 5) & ECMA Compatible
 High Isolation 2000 V_{RMS}
 Fast Rise Times
 Transfer Molded DIP / SMD Packages

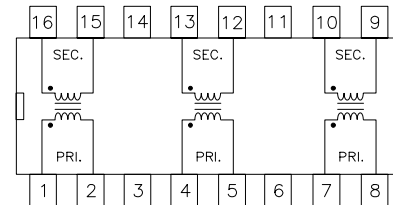
Electrical Specifications at 25° C

Quad 50 mil SMD P/N	Quad 100 mil DIP P/N	Triple 50 mil SMD P/N	Triple 100 mil DIP P/N	Turns Ratio (± 5%)	OCL (μH) (± 20%)	E-T min. (V-μS)	Rise Time max. (ns)	Pri./Sec. C _{WVW} max. (pF)	L _L max. (μH)	DCR max. (Ω)
T-50801	T-50501	T-14000	T-10902	1:1	50	2.1	3.0	9	.20	.20
T-50811	T-50511	T-14001	T-10903	1:1	75	2.3	3.0	10	.25	.25
T-50802	T-50502	T-14002	T-10905	1:1	100	2.7	3.5	10	.30	.30
T-50813	T-50513	T-14003	T-10906	1:1	150	3.0	3.5	12	.35	.35
T-50803	T-50503	T-14004	T-10907	1:1	200	3.5	3.5	15	.40	.40
T-50816	T-50516	T-14005	T-10908	1:1	250	3.5	3.5	15	.45	.45
T-50817	T-50517	T-14055	T-10913	1:1.41	50	2.1	3.0	9	.20	.20
T-50818	T-50518	T-14056	T-10914	1:1.41	75	2.3	3.0	10	.25	.25
T-50819	T-50519	T-14057	T-10916	1:1.41	100	2.7	3.5	10	.30	.30
T-50814	T-50514	T-14058	T-10917	1:1.41	150	3.0	3.5	12	.35	.35
T-50820	T-50520	T-14059	T-10918	1:1.41	200	3.5	3.5	15	.40	.40
T-50821	T-50521	T-14060	T-10919	1:1.41	250	3.5	3.5	15	.45	.45
T-50822	T-50522	T-14061	T-10922	1:2	50	2.1	3.0	9	.20	.20
T-50823	T-50523	T-14062	T-10923	1:2	75	2.3	3.0	10	.25	.25
T-50824	T-50524	T-14063	T-10925	1:2	100	2.7	3.5	10	.30	.30
T-50825	T-50525	T-14064	T-10926	1:2	150	3.0	3.5	12	.35	.35
T-50826	T-50526	T-14065	T-10927	1:2	200	3.5	3.5	15	.40	.40
T-50827	T-50527	T-14066	T-10928	1:2	250	3.5	3.5	15	.45	.45

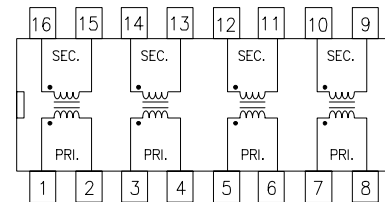
Dimensions in Inches (mm)



16-Pin Triple Schematic



16 Pin QUAD Schematic



SMD versions available
on Tape & Reel

To Specify 100 mil G-SMD Package
add "G" Suffix to P/n from Table above:

T-10905 = 100 mil DIP version
 T-10905G = 100 mil G-SMD version

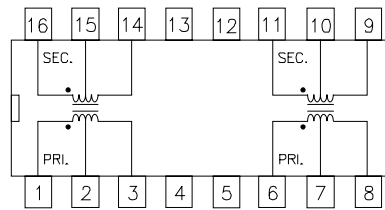
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 PDF catalogs and data sheets please visit
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10 BASE-T Transformers Dual SMD/DIP

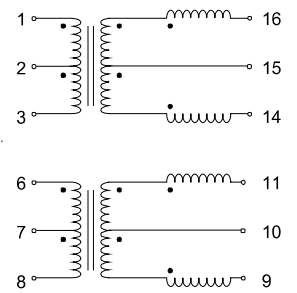
Available with Common Mode Choke

- High Isolation 2000Vrms
- Fast Rise Times
- Meets ECMA Requirements
- IEEE 802.3 Compatible (10BASE 2, 10BASE 5, & 10BASE T)
- Common Mode Choke Option
- Available in Surface Mount 50 mil or 100 mil 16-Pin Gullwing

Schematic
16 Pin Dual



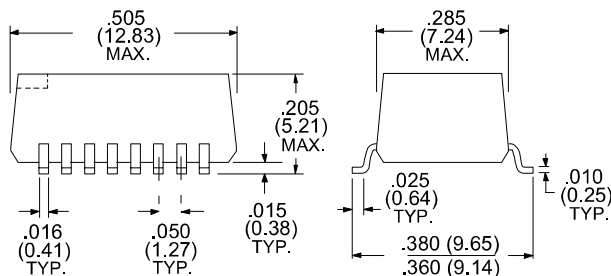
Schematic
16 Pin Dual with
Common Mode Choke



Electrical Specifications at 25° C

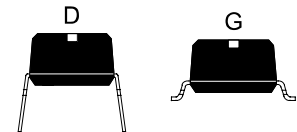
100 mil DIP Part Number	100 mil DIP P/N W/CMC	50 mil Part Number	50 mil P/N W/CMC	Turns Ratio $\pm 3\%$ (1-3:16-14)/(6-8:11-9)	OCL TYP (μH)	E-T min. (μS)	Rise Time max. (ns)	Pri. / Sec. $C_{w/w}$ max. (pF)	L_L max. (μH)	DCR_p max. (Ω)
T-13010	T-14810	T-14010	T-14910	1CT:1CT/1CT:1CT	50	2.1	3.0	9	.20	.20
T-13011	T-14811	T-14011	T-14911	1CT:1CT/1CT:1CT	75	2.3	3.0	10	.25	.25
T-13000	T-14800	T-14012	T-14912	1CT:1CT/1CT:1CT	100	2.7	3.5	10	.30	.30
T-13012	T-14812	T-14013	T-14913	1CT:1CT/1CT:1CT	150	3.0	3.5	12	.35	.35
T-13001	T-14801	T-14014	T-14914	1CT:1CT/1CT:1CT	200	3.5	3.5	15	.40	.40
T-13013	T-14813	T-14015	T-14915	1CT:1CT/1CT:1CT	250	3.5	3.5	15	.45	.45
T-13014	T-14814	T-14024	T-14924	1CT:1CT/1CT:1.41CT	50	2.1	3.0	9	.20	.20
T-13015	T-14815	T-14025	T-14925	1CT:1CT/1CT:1.41CT	75	2.3	3.0	10	.25	.25
T-13016	T-14816	T-14026	T-14926	1CT:1CT/1CT:1.41CT	100	2.7	3.5	10	.30	.30
T-13017	T-14817	T-14027	T-14927	1CT:1CT/1CT:1.41CT	150	3.0	3.5	12	.35	.35
T-13018	T-14818	T-14028	T-14928	1CT:1CT/1CT:1.41CT	200	3.5	3.5	15	.40	.40
T-13019	T-14819	T-14029	T-14929	1CT:1CT/1CT:1.41CT	250	3.5	3.5	15	.45	.45
T-13020	T-14820	T-14030	T-14930	1CT:1.41CT/1CT:1.41CT	50	2.1	3.0	9	.20	.20
T-13021	T-14821	T-14031	T-14931	1CT:1.41CT/1CT:1.41CT	75	2.3	3.0	10	.25	.25
T-13022	T-14822	T-14032	T-14932	1CT:1.41CT/1CT:1.41CT	100	2.7	3.5	10	.30	.30
T-13023	T-14823	T-14033	T-14933	1CT:1.41CT/1CT:1.41CT	150	3.0	3.5	12	.35	.35
T-13024	T-14824	T-14034	T-14934	1CT:1.41CT/1CT:1.41CT	200	3.5	3.5	15	.40	.40
T-13025	T-14825	T-14035	T-14935	1CT:1.41CT/1CT:1.41CT	250	3.5	3.5	15	.45	.45
T-13026	T-14826	T-14036	T-14936	1CT:1CT/1CT:2CT	50	2.1	3.0	9	.20	.20
T-13027	T-14827	T-14037	T-14937	1CT:1CT/1CT:2CT	75	2.3	3.0	10	.25	.25
T-13028	T-14828	T-14038	T-14938	1CT:1CT/1CT:2CT	100	2.7	3.5	10	.30	.30
T-13029	T-14829	T-14039	T-14939	1CT:1CT/1CT:2CT	150	3.0	3.5	12	.35	.35
T-13030	T-14830	T-14040	T-14940	1CT:1CT/1CT:2CT	200	3.5	3.5	15	.40	.40
T-13031	T-14831	T-14041	T-14941	1CT:1CT/1CT:2CT	250	3.5	3.5	15	.45	.45
T-13032	T-14832	T-14042	T-14942	1CT:2CT/1CT:2CT	50	2.1	3.0	9	.20	.20
T-13033	T-14833	T-14043	T-14943	1CT:2CT/1CT:2CT	75	2.3	3.0	10	.25	.25
T-13034	T-14834	T-14044	T-14944	1CT:2CT/1CT:2CT	100	2.7	3.5	10	.30	.30
T-13035	T-14835	T-14045	T-14945	1CT:2CT/1CT:2CT	150	3.0	3.5	12	.35	.35
T-13036	T-14836	T-14046	T-14946	1CT:2CT/1CT:2CT	200	3.5	3.5	15	.40	.40
T-13037	T-14837	T-14047	T-14947	1CT:2CT/1CT:2CT	250	3.5	3.5	15	.45	.45

50 mil Package
Dimensions in Inches (mm)



SMD versions
available on
Tape & Reel

16 Pin 100 mil DIP/SMD Packages
(Add G to P/N for SMD)
See package drawings pg. 21



For complete details including downloadable
PDF catalogs and data sheets please visit
www.rhombus-ind.com

10BASE-T QUAD PORT TRANSFORMERS

- Fast Rise Times
- Meets ECMA Requirements
- IEEE 802.3 Compatible
- Operating temperature Range -45°C to +85°C

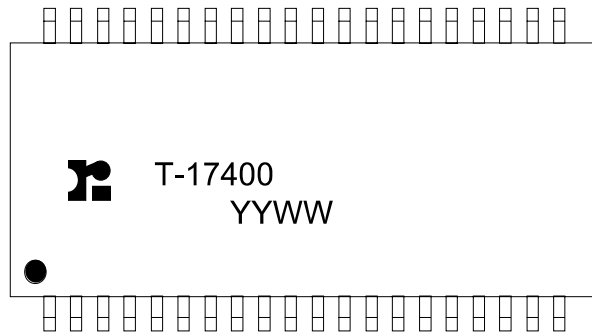
Electrical Specifications at 25° C ^{2,3}

Part Number	Turns Ratio ($\pm 2\%$) Transmit	Sine Wave Inductance ($\mu\text{H min.}$) ¹	Interwinding Capacitance (pF max.) ¹	Leakage Inductance ($\mu\text{H max.}$) ¹	Return Loss 5 to 10MHz (dB min.)		Common Mode Rejection TX (dB min.)					Hipot min. (V_{RMS})
					100 Ω	98 \pm 13 Ω	5 MHz	10 MHz	50 MHz	100 MHz	200 MHz	
T-17400	1CT : 1CT	150	10	0.30	-20	-15	-60	-50	-35	-25	-20	1500
T-17401	1CT : 1CT	150	10	0.30	-20	-15	-60	-50	-35	-25	-20	1500
T-17402	1CT : $\sqrt{2}$ CT	150	10	0.30	-20	-15	-60	-50	-30	-25	-20	1500
T-17403	1CT : $\sqrt{2}$ CT	150	10	0.30	-20	-15	-60	-50	-35	-20	-15	1500
T-17404	1CT : 2CT	180	10	0.30	-20	-15	-50	-40	-30	-20	-14	1500
T-17405	1CT : 1CT	150	10	0.30	-20	-15	-60	-50	-34	-25	-18	1500

1. Measured at 20 mVrms, 100 kHz.
2. **Insertion Loss:** Typically -0.5 dB max. from 1 to 10 MHz.
3. **Crosstalk :** -35 dB minimum from 1 to 10 MHz.

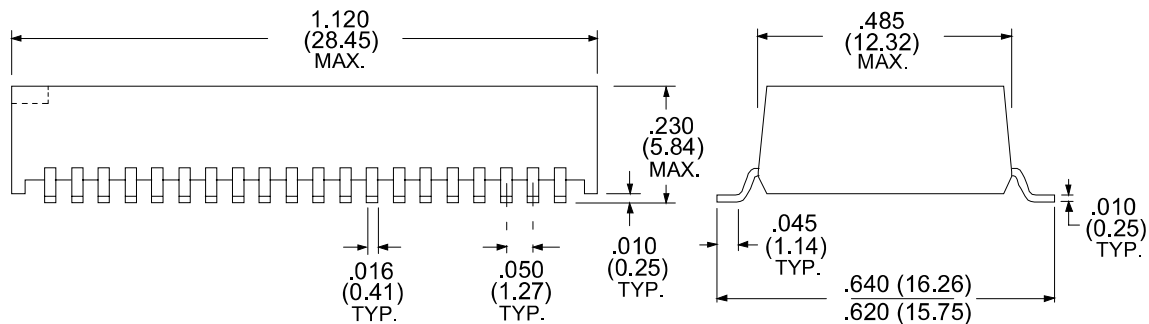
For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

Refer to Schematic Diagrams on Next 2 Pages



Dimensions in inches (mm)

Tape & Reel Available

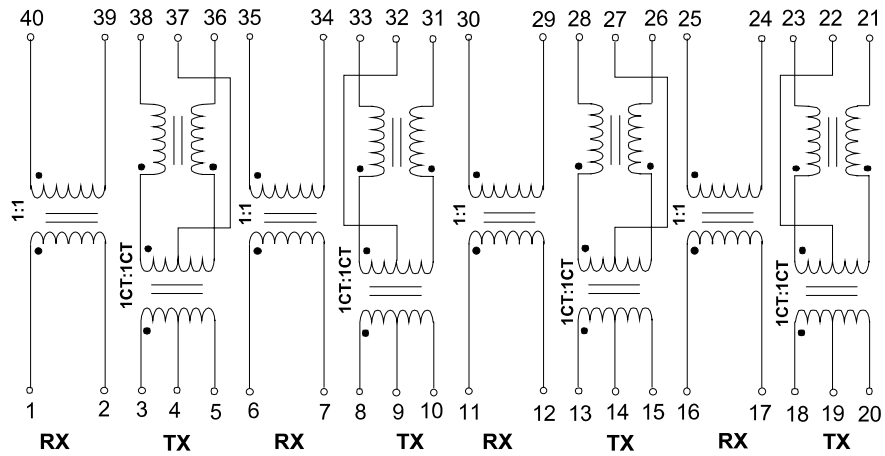


PT21

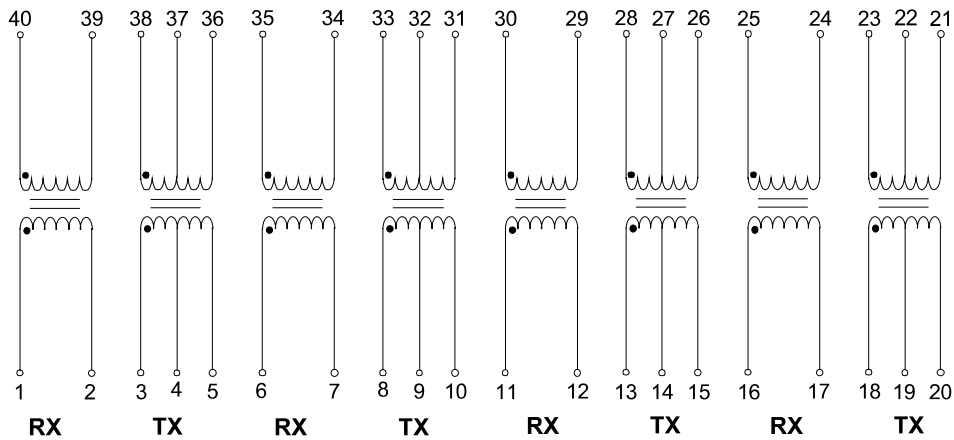
For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

(Schematics for P/N T-17403, T-17404 & T-17405 on Next Page)

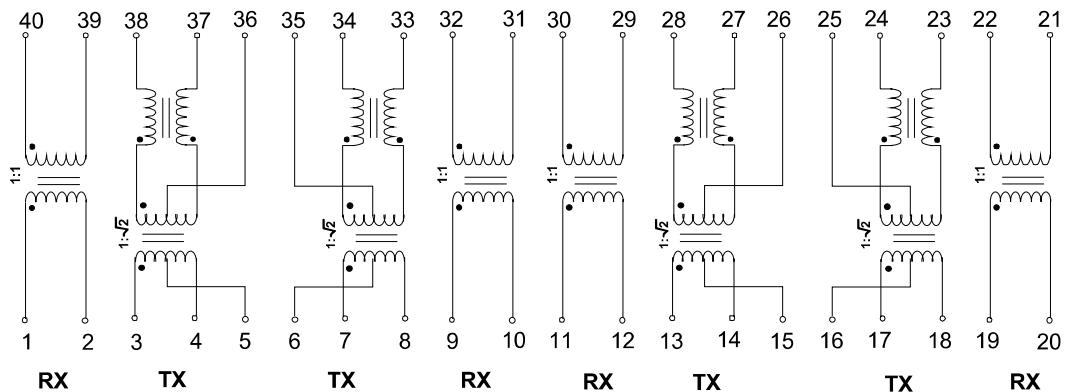
Schematic Diagram for P/N T-17400



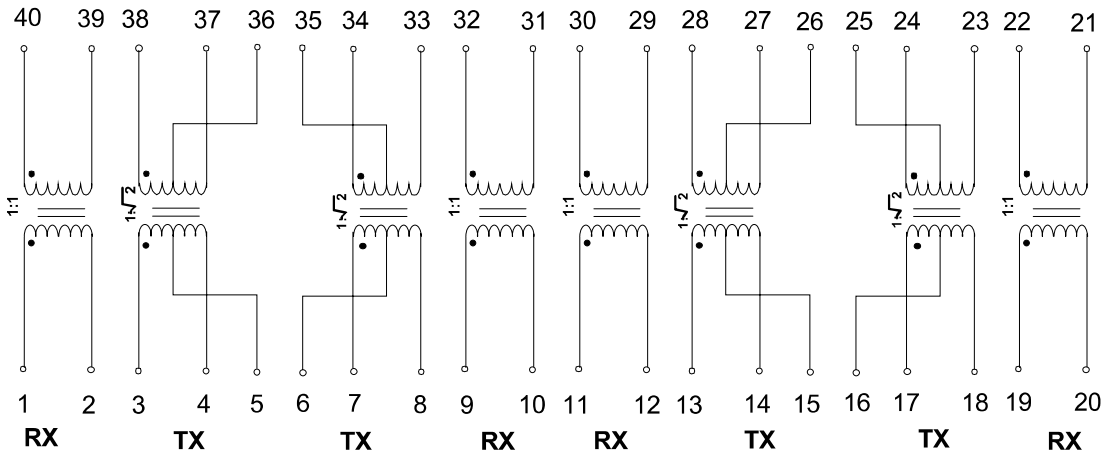
Schematic Diagram for P/N T-17401



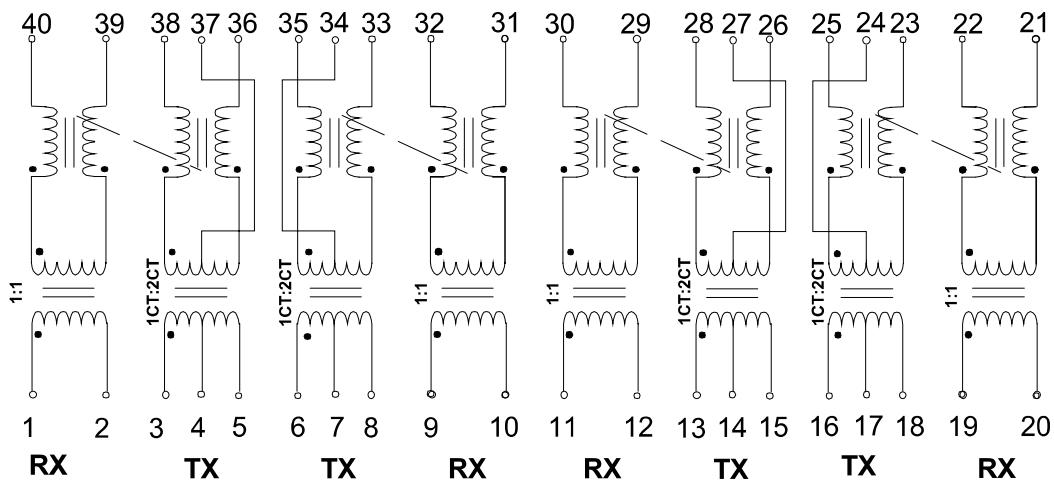
Schematic Diagram for P/N T-17402



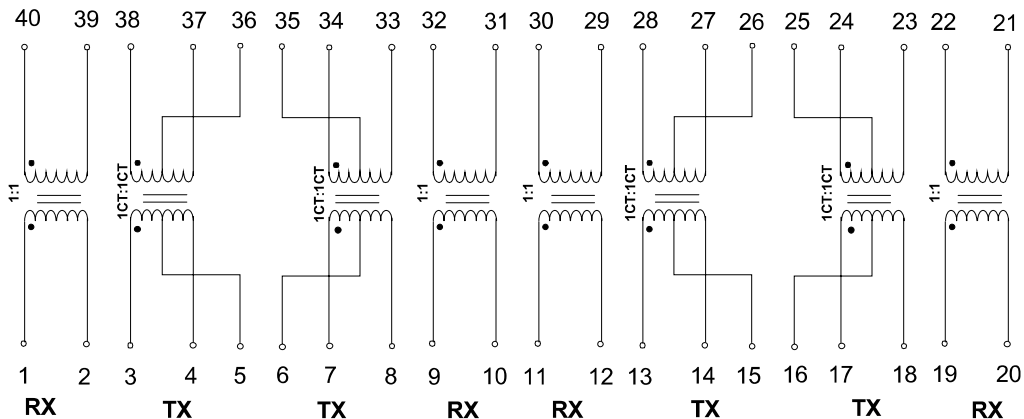
Schematic Diagram for P/N T-17403



Schematic Diagram for P/N T-17404



Schematic Diagram for P/N T-17405



10/100 BASE-T SINGLE PORT TRANSFORMER MODULE

1 : 1 Transmit Turns Ratio Compatible With Intel, National Semiconductor, Level One, ICS, Kendin, TDK, Broadcom, SEEQ and Lucent Transceivers

Electrical Specifications at 25° C

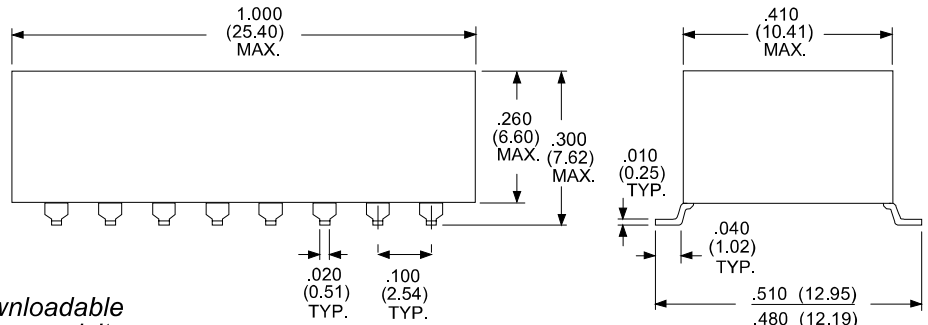
Part Number	Insertion Loss (dB max.)	Return Loss (dB min. @ 100Ω)				Crosstalk (dB min.)			Differential to Common Mode Rejection (dB min.)			Hipot (Vrms min.)
		0.1-100MHz	1-30MHz	40MHz	50MHz	60-80MHz	30MHz	60MHz	100MHz	30MHz	60MHz	
T-17000	-1.0	-22	-20	-18	-12	-50	-40	-40	-42	-38	-32	1500
T-17001	-1.0	-22	-20	-18	-12	-50	-40	-40	-45	-40	-35	1500
T-17002	-1.0	-22	-20	-18	-12	-50	-40	-40	-45	-40	-35	1500
T-17003	-1.0	-20	-18	-18	-14	-45	-40	-35	-45	-40	-35	1500
T-17004	-1.0	-20	-20	-18	-14	-50	-40	-40	-42	-36	-33	1500
T-17006	-1.0	18	-18	-16	-12	-55	-50	-50	-50	-45	-40	1500

■ Mil-Grade Epoxy encapsulated package withstands 235°C IR reflow

■ Meets all IEE 802.3 and ANSI X3.263 standards including 350 μH OCL with 8 mA bias

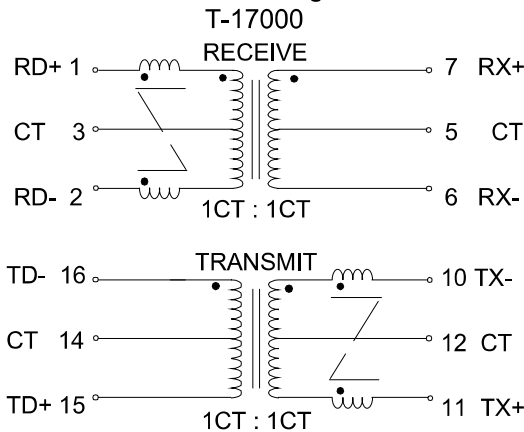
■ Tape and Reel available.

For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

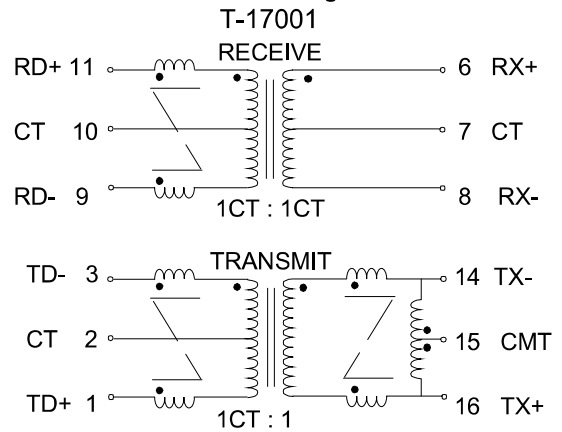


Dimensions in inches (mm)

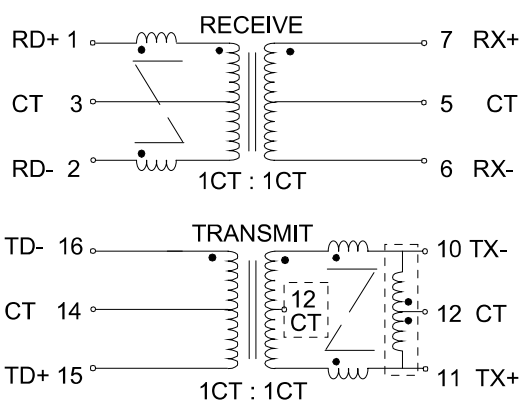
Schematic Diagram



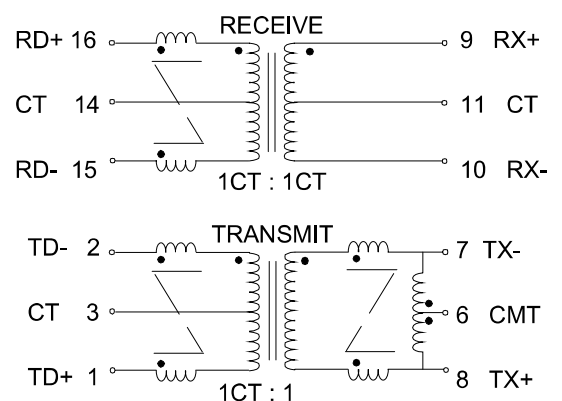
Schematic Diagram



Schematic Diagram
T-17002, T-17004 & T-17006



Schematic Diagram
T-17003



10/100BASE-TX QUAD PORT TRANSFORMER

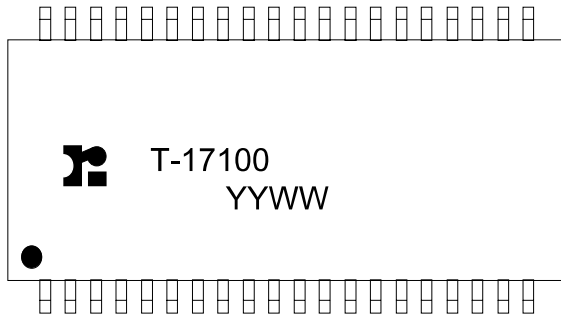
Electrical Specifications at 25° C

Part Number	Insertion Loss (dB TYP.)	Return Loss (dB MIN)				Crosstalk (dB TYP)				Common to common Rejection Ratio 0.1-60MHz(dB typ.)		Differential to Common Mode Rejection (dB typ.)	
		.1-100MHz	2-30MHz	40MHz	50MHz	60-80MHz	1MHz	30MHz	60MHz	100MHz	Transmit	Receive	1-60MHz
T-17100	-0.5	-21	-17	-14.5	-12	-65	-55	-45	-35	-30	-30	-40	-30
T-17101	-0.5	-21	-17	-14.5	-12	-65	-55	-45	-35	-30	-30	-40	-30
T-17102	-0.5	-21	-17	-14.5	-12	-65	-50	-40	-30	-30	-30	-40	-30
T-17103	-0.5	-21	-17	-14.5	-12	-65	-50	-40	-30	-30	-30	-40	-30
T-17104	-0.5	-21	-17	-14.5	-12	-65	-55	-45	-35	-30	-30	-40	-30
T-17105	-0.5	-21	-17	-14.5	-12	-65	-50	-40	-30	-30	-30	-40	-30

- Meets all IEE 802.3u and ANSI X3.263 standards including 350 μH OCL with 8 mA bias
- Model designed to support four single or double stacked RJ-45 connectors

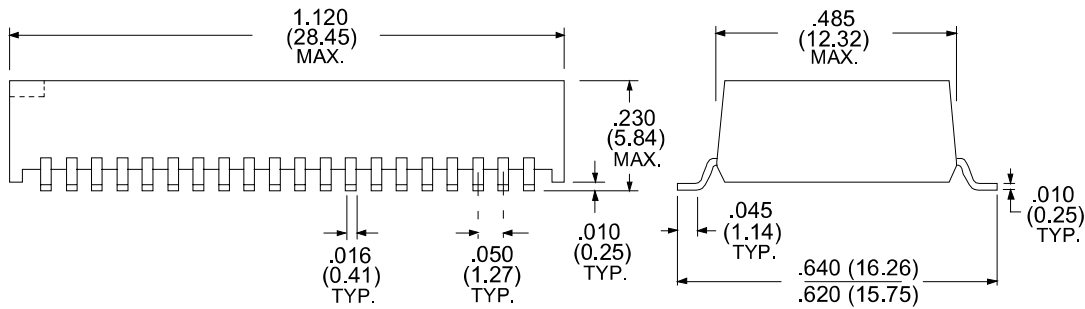
For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

Refer to Schematic
Diagrams on Next 2 Pages

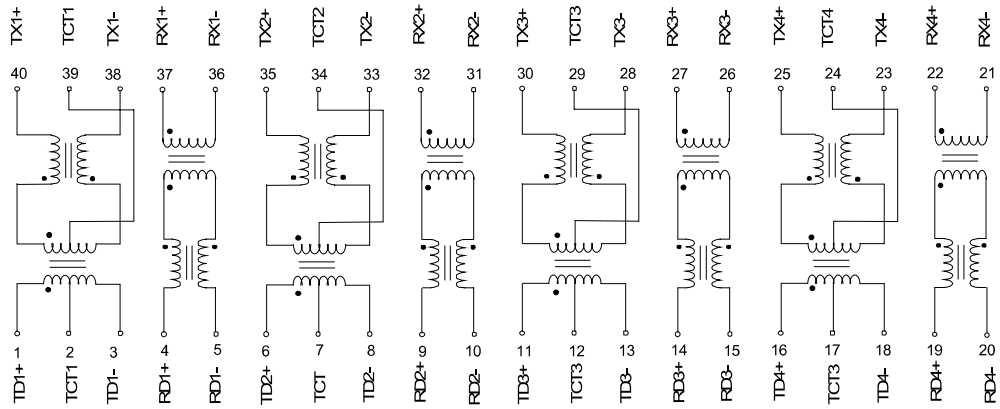


Dimensions in inches (mm)

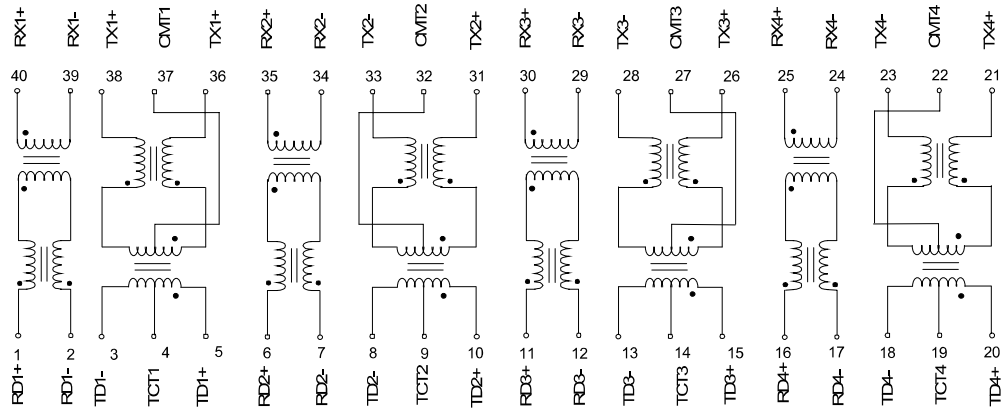
Tape & Reel
Available



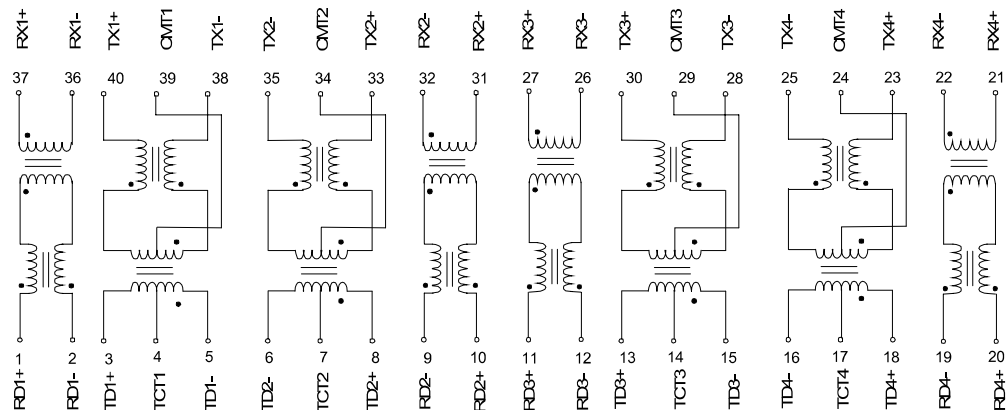
Schematic Diagram for P/N T-17100



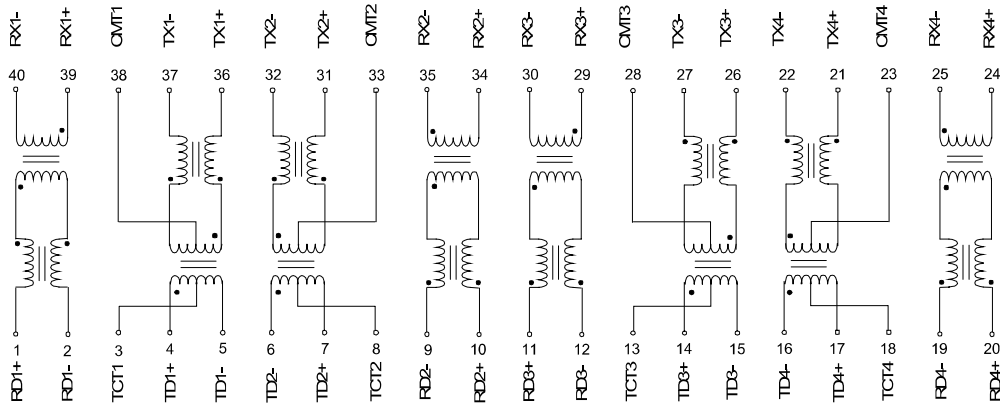
Schematic Diagram for P/N T-17101



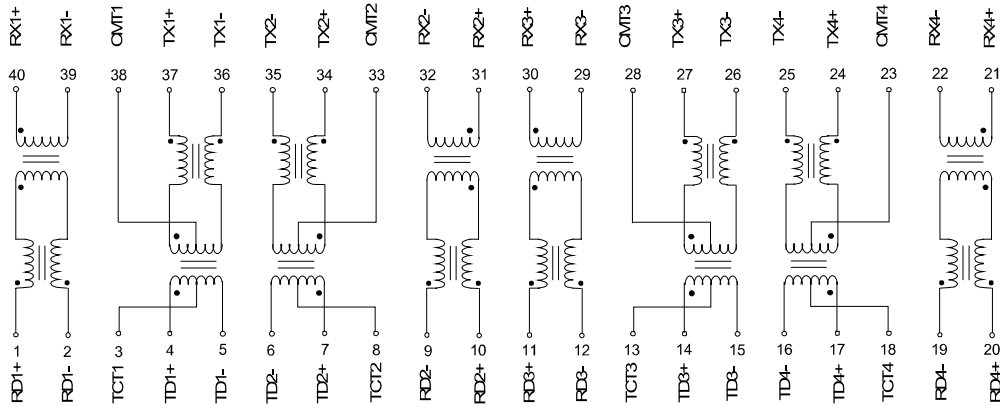
Schematic Diagram for P/N T-17102



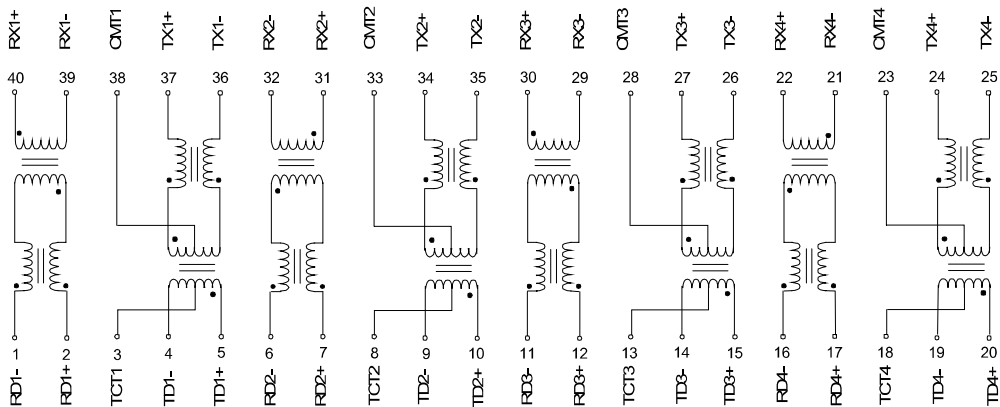
Schematic Diagram for P/N T-17103



Schematic Diagram for P/N T-17104



Schematic Diagram for P/N T-17105



10/100 BASE-T SINGLE PORT MAGNETICS MODULES

16-PIN 50-MIL SM PACKAGE

■ Meets all IEE 802.3 and ANSI X3.263 standards including 350 μ H OCL with 8 mA bias

■ Designed for reflow soldering at temperatures up to 235°C

Electrical Specifications at 25° C

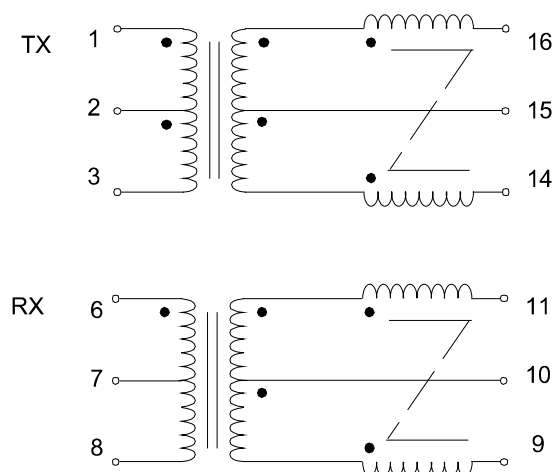
Part Number	Loss (dB MAX)	Insertion Return Loss (dB Typ)			Crosstalk (dB MIN)			Differential to Common Mode Rejection (dB MIN)			Turns Ratio		Hi-pot (Vrms min.)
		50MHz	60MHz	80MHz	30MHz	60MHz	100MHz	30MHz	50MHz	100MHz	TX	RX	
T-17200	1.1	-20	-14	-11.5	-45	-40	-35	-42	-37	-33	2:1	1:1	1500
T-17201	1.1	-20	-14	-11.5	-45	-40	-35	-42	-37	-33	1.25:1	1:1	1500
T-17202	1.1	-20	-14	-11.5	-45	-40	-35	-42	-37	-33	1:1	1:1	1500
T-17203	1.1	-18	-12	-11.5	-45	-40	-35	-42	-37	-30	1:1.414	1:1	1500

Electrical Specifications at 25° C

Part Number	CMR (dB typ.) (0.1-100MHz)	Crosstalk (dB min) (0.1-100MHz)	Insertion Loss (dB min) (0.1-100MHz)	Return Loss (dB min)				Cw/w max. (pF)	L _L max. (μ H)	DCR max. (Ω)	Turns Ratio
				0.5-30MHz	40MHz	50MHz	60-80MHz				
T-17204	-40	-40	-1.1	-18	-15.5	-13.6	-12	15	0.4	1.5	1CT:1CT \ 1CT:1CT

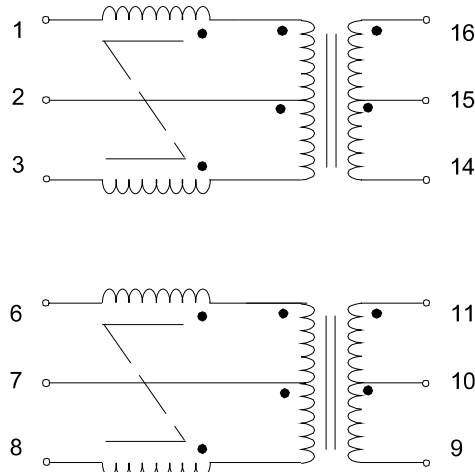
Schematic Diagram

P/N T-17200, -17201, -17202 & -17203



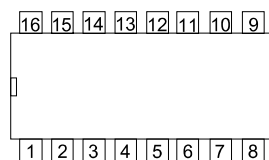
Schematic Diagram

P/N T-17204

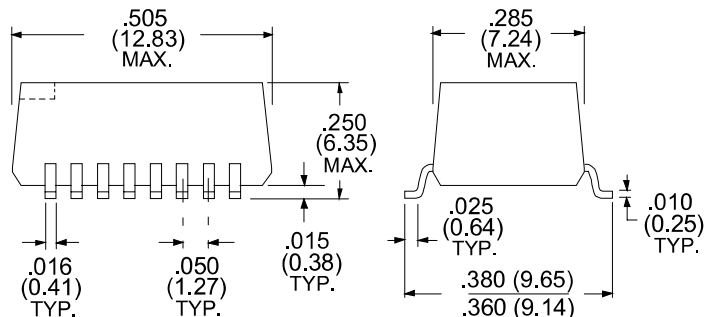


Dimensions in inches (mm)

16-Pin Footprint



Tape & Reel available.



For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

10/100 BASE-TX DUAL PORT TRANSFORMER MODULES

FOR USE WITH TRANSCEIVERS REQUIRING 1 : 1 TRANSMIT AND RECEIVE TURNS RATIOS

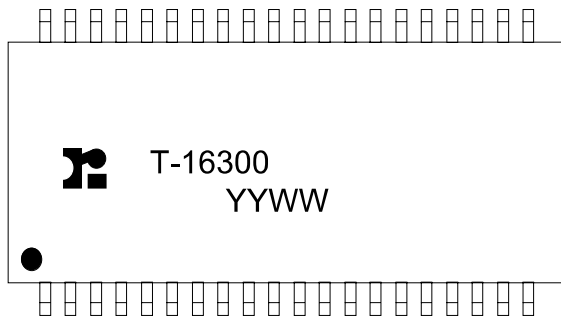
Electrical Specifications at 25° C

Part Number	Insertion Loss (dB TYP)	Returns Loss (dB MIN)				Crosstalk (dB TYP)				Common to Common Rejection Ratio 0.1-60 MHz (dB TYP)		Differential Common Mode Rejection (dB TYP)	
		2-30MHz	40MHz	50MHz	60-80MHz	1MHz	30MHz	60MHz	100MHz	Transmit	Receive	1-60MHz	60-200MHz
T-16300	-0.5	-21	-17	-14.5	-12	-65	-55	-45	-35	-30	-30	-40	-30
T-16301	-0.5	-21	-17	-14.5	-12	-65	-55	-45	-35	-45	-30	-53	-40
T-16302	-0.5	-21	-17	-14.5	-12	-65	-55	-45	-35	-40	-30	-45	-35
T-16303	-0.5	-21	-17	-14.5	-12	-65	-55	-45	-35	-40	-30	-45	-35
T-16304	-1.2	-16	-14	-13.0	-12	-50	-45	-40	-35	-40	-30	-37	-33

- Compliant with IEEE 802.3u and ANSI X3.263 standards including 350 μH OCL with 8 mA bias
- IC grade transfer-molded package withstands 25°C peak temperature profile
- Modules designed to support two RJ-45 connectors

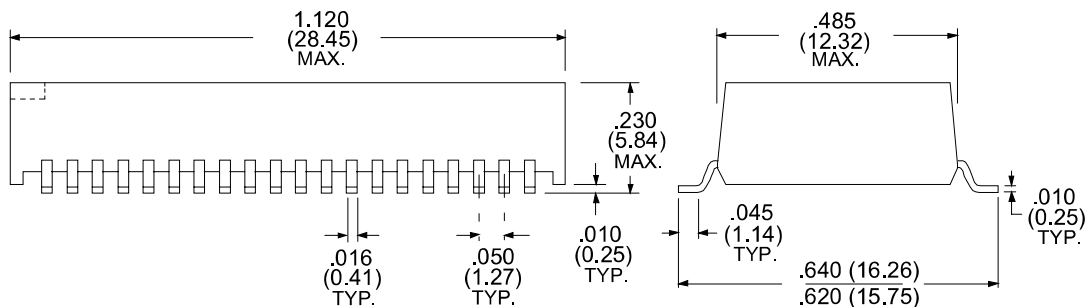
For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

Refer to Schematic Diagrams on Next Page.

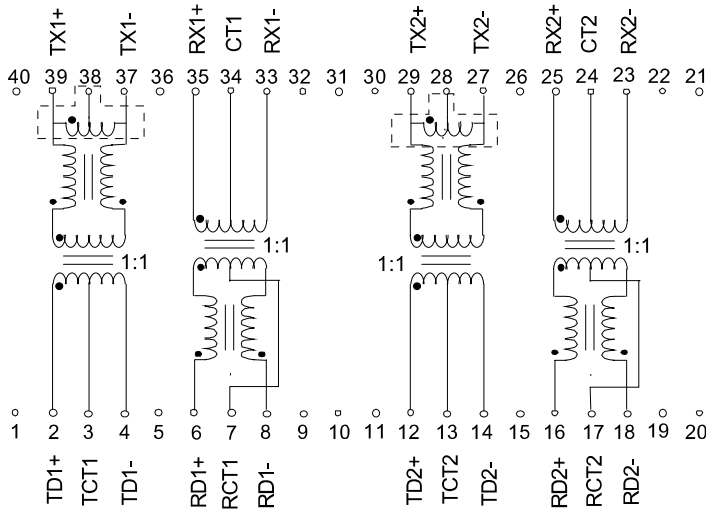


Dimensions in inches (mm)

Tape & Reel Available

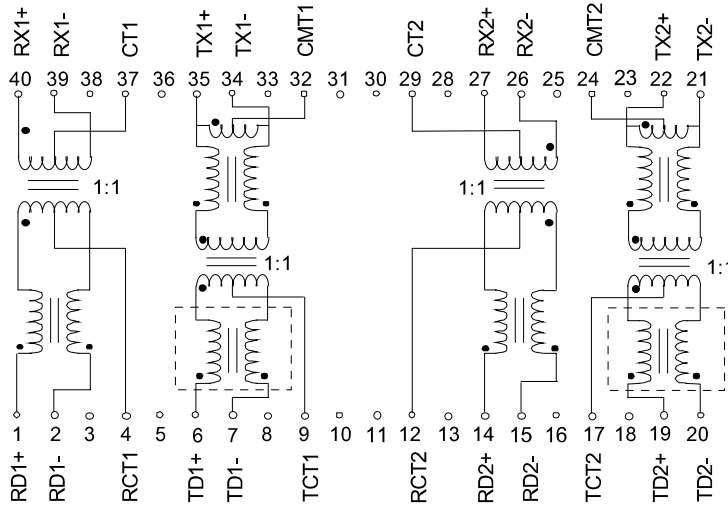


For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com



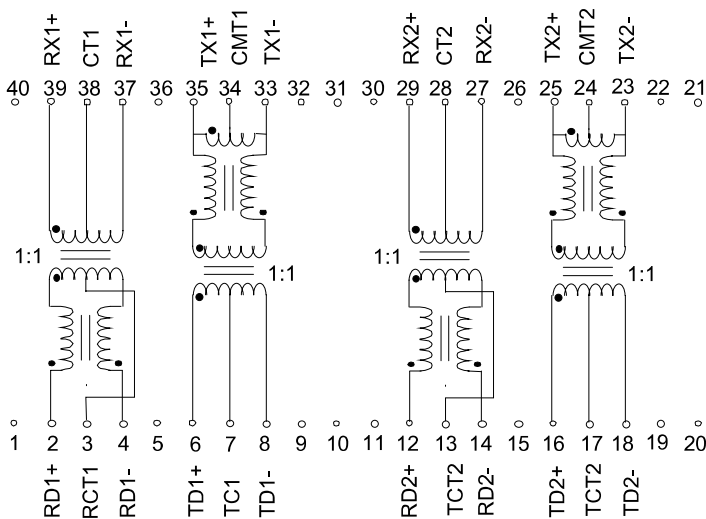
Schematic Diagram T-16300 & T-16304

The shunt chokes (pins 27-29 & 37-39)
only included on p/n T-16304



Schematic Diagram T-16301 & T-16302

The shunt chokes (pins 6-7 & 19-20)
only included on p/n T-16301



Schematic Diagram T-16303

1000BASE - T MAGNETICS MODULE

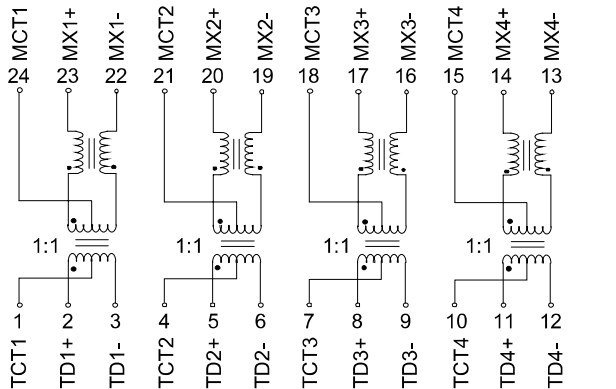
24-Pin SMD 1-Port 1000BASE - TX Magnetics Designed to meet requirements of 1Gbit Applications

- Designed for long haul Gigabit Ethernet 100/1000Base-T, full duplex applications
- Cable interface for isolation and low common mode emissions
- Supports 4 pairs of category 5 UTP cable
- Compliant with IEEE 802.3ab standard for 1000Base-T
- Operating Temperature range 0 to +70 °C

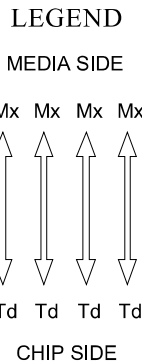
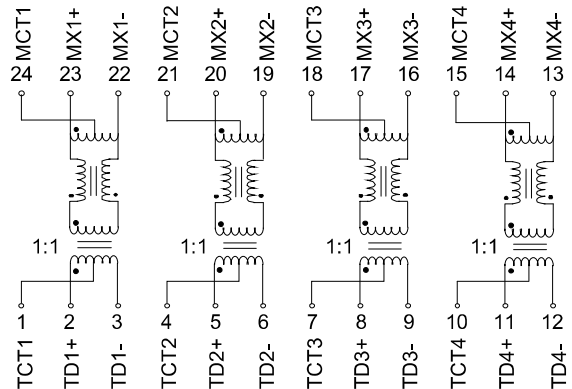
Electrical Specifications at 25° C

Part Number	Insertion Loss Max. (dB)	Return Loss (dB MIN @ 100Ω)						Crosstalk (dB Min.)			Differential to Common Mode Rejection (dB Min.)			Hi-pot Min. (Vrms)
		1-100MHz	1-30MHz	40MHz	50MHz	60-80MHz	100MHz	30MHz	60MHz	100MHz	30MHz	60MHz	100MHz	
T-17300	1.0	-18	-14.4	-13.1	-12	-10	-45	-40	-35	-43	-37	-33	1500	
T-17301	1.0	-18	-14.4	-13.1	-12	-10	-45	-40	-35	-43	-37	-33	1500	

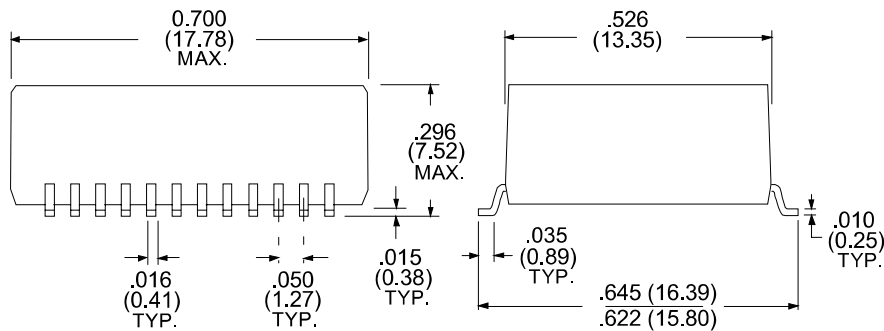
Schematic for P/N T-17300



Schematic for P/N T-17301



Dimensions in inches (mm)



For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

Data Line Filters

Data Line Protection Applications

Frequency Range up to 100 MHz

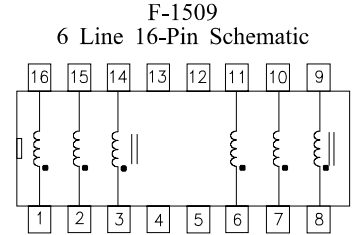
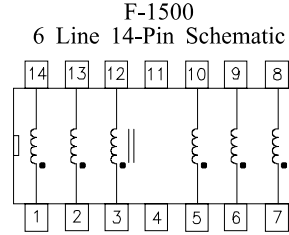
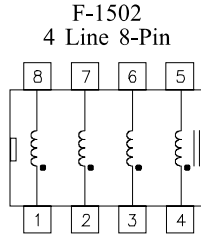
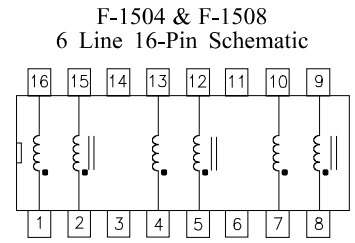
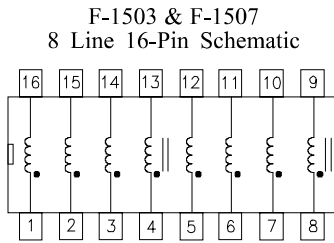
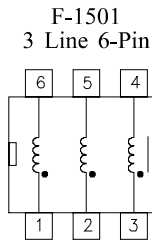
Filter Common & Differential Mode Noise

EMI / RFI Suppression

High Current & Voltage Isolation

Hi-Pot 500 V_{RMS} Minimum

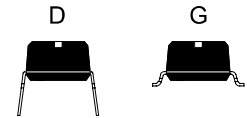
Tape & Reel available for SMD versions



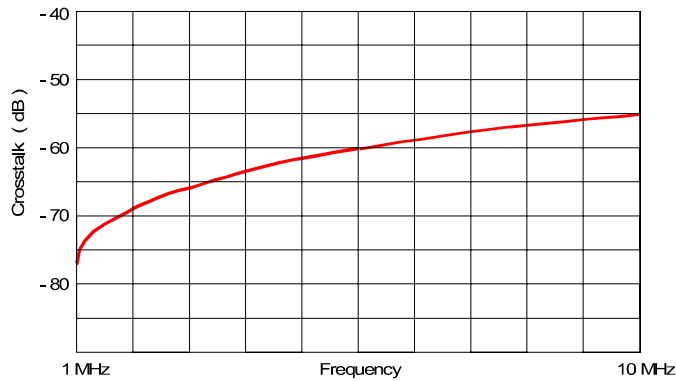
Electrical Specifications at 25°C

DIP Part Number	Data Lines	Coils	Turns Ratio	OCL min. (μH)	L _L max. (μH)	DCR max. (mΩ)	C _{www} max. (pF)	(See Dwg. on Pg. 40) Package
F-1500	6	2	1:1:1	85	0.25	200	9.5	14 Pin
F-1501	3	1	1:1:1	85	0.25	200	9.5	6 Pin
F-1502	4	1	1:1:1:1	85	0.25	200	9.5	8 Pin
F-1503	8	2	1:1:1:1	85	0.25	200	12.0	16 Pin
F-1504	6	3	1:1	85	0.25	200	10.0	16 Pin

100 mil DIP/SMD drawings see page:
 6-Pin pg. 37
 8 & 14-Pin pg. 39
 16-Pin pg. 20

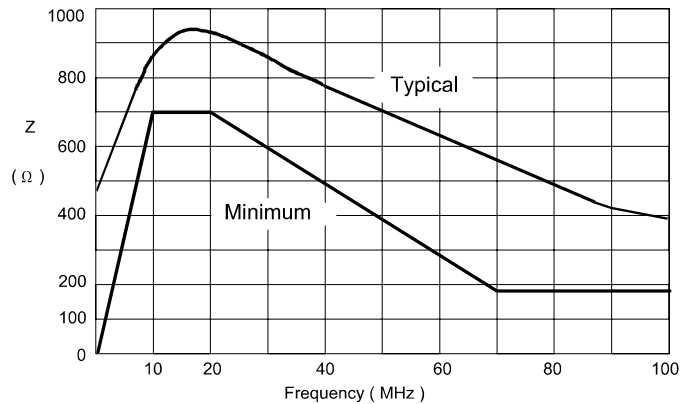


*Crosstalk



*For Dataline Filters with two coils or more

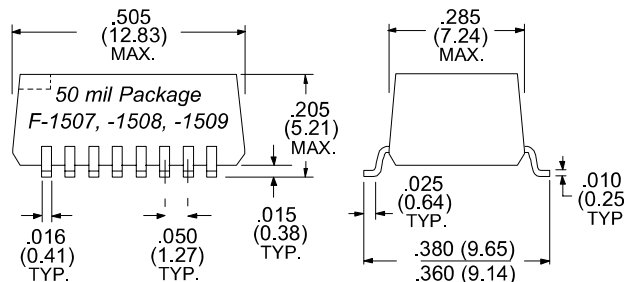
Impedance



50 mil P/N	Data Lines	Coils	Turns Ratio	OCL min. (μH)	L _L max. (μH)	DCR max. (mΩ)	C _{www} max. (pF)	50 mil Package
F-1507	8	2	1:1:1:1	85	0.25	200	12.0	16-Pin
F-1508	6	3	1:1	85	0.25	200	12.0	16-Pin
F-1509	6	2	1:1:1	85	0.25	200	12.0	16-Pin

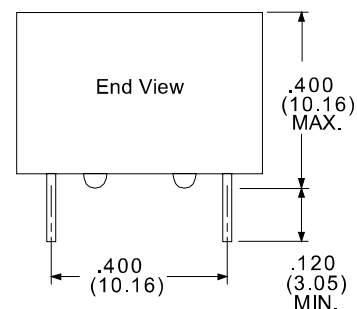
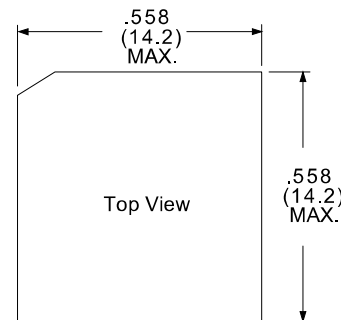
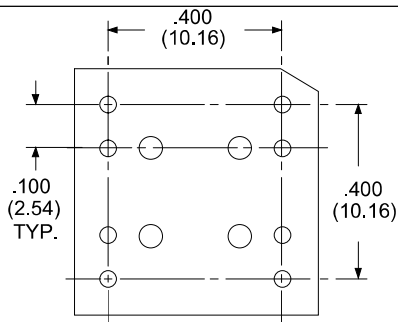
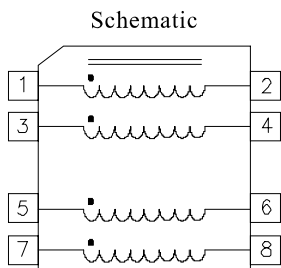
For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

50 mil Package
 F-1507, -1508, -1509
 Dimensions in Inches (mm)



Common Mode Chokes for Telecom Applications

Designed for 4-Wire Links ISDN S / T1
 For EMI Reduction - Filters Common Mode Noise
 500 V_{RMS} Minimum Isolation Between Windings
 Frequencies 100 kHz to 200MHz



Dimensions in inches (mm)

Low Frequency Chokes

Electrical Specifications at 25°C

LF Choke Part Number	OCL min. (mH)	L _L sec max. (μH)	C _{www} max. (pF)	DCR max. (Ω)	Z _{oc} min. (kΩ) 150 kHz	Z _{oc} min. (kΩ) 300 kHz	Z _{oc} min. (kΩ) 500 kHz	Z _{oc} min. (kΩ) 1MHz
F-1400	6.0	35.0	22	1.4	5.5	8.0	8.0	9.0
F-1401	4.0	30.0	10	0.7	3.3	6.0	8.0	11.0
F-1402	4.0	0.7	40	0.7	3.3	6.0	8.0	11.0
F-1403	1.0	10.0	10	0.7	0.9	1.6	2.3	3.3

SMD Versions available.
Contact factory for p/n
Package as per page 13.

High Frequency Chokes

Electrical Specifications at 25°C

HF Choke Part Number	OCL min. (μH)	L _L sec max. (μH)	C _{www} max. (pF)	DCR max. (Ω)	Z _{oc} min. (kΩ) 10 MHz	Z _{oc} min. (kΩ) 30 MHz	Z _{oc} min. (kΩ) 70MHz	Z _{oc} min. (kΩ) 100MHz
F-1600	24.0	0.20	15	0.30	0.9	1.60	1.15	0.80
F-1601	16.0	0.20	12	0.30	0.7	1.35	1.05	0.65
F-1602	8.0	0.20	10	0.25	0.55	1.10	1.00	0.52

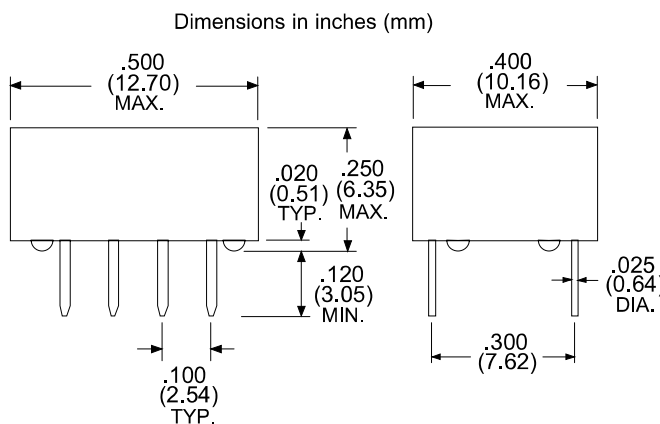
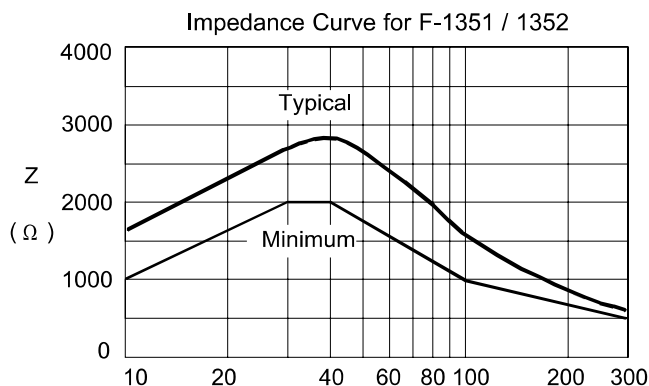
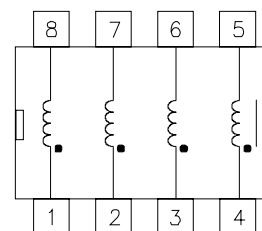
For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com

LAN Chokes

Electrical Specifications at 25°C

Part Number	Turns Ratio	OCL min. (μH)	L _L sec max. (μH)	C _{www} max. (pF)	DCR max. (Ω)	HI-POT min. (V _{RMS})	Package Style
F-1351	1:1:1:1	18	.3	65	25	500	8 Pin
F-1352	1:1:1:1	36	.3	200	25	500	8 Pin

Schematic for P/N F-1351 & F-1352



DDS Applications Pulse Transformers

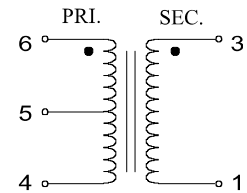
Compatible with Level One
transceiver ICs
Low Profile "Touch Tone" Designs
Surface Mount Designs

Designed to meet the requirements
of Bellcore TR-NWT-000499,
Synchronous Digital Data
Interface-64 Kbps and Subrates

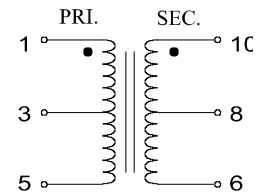
Electrical Specifications at 25°C

Parameter		T-710-5	T-997G	T-998G	Units
Turns Ratio		1:1 ± 1%	1:1 ± 1%	1:1 ± 1%	
Pri. Impedance	100 Ω on Sec.	135	135	143	Ω
Longitudinal Balance	200 - 1000 Hz 15 kHz	60 min. 40 min.	40 typ. 35 typ.	40 typ. 35 typ.	dB dB
Pri. DC Resistance		19.5 max.	18.2 typ.	2.9 typ.	Ω
Sec. DC Resistance		19.5 max.	18.2 typ.	5.9 typ.	Ω
Frequency Response	100Hz - 112kHz	1.0 typ.	1.0 typ.	---	dB
Frequency Response	1 kHz - 200kHz	---	---	1.0 max.	dB
Insertion Loss	10kHz	1.25 max.	1.25 typ.	0.50 typ.	dB
Isolation (HI-POT)		1500	1875	1875	V _{RMS}
Primary DC		0	0	0	mA
Inductance	1 kHz & 1V _{RMS}	200 min.	200 min.	40 min.	mH
Leakage Inductance	10 kHz & 0.5V _{RMS}	43 max.	60 max.	40 max.	μH
Interwinding Capacitance	10 kHz & 1V _{RMS}	65 max.	65 max.	65 max.	pF
Return Loss	100Hz to 100kHz	15 min.	15 typ.	---	dB
Return Loss	1 kHz - 200kHz	---	---	15 typ.	dB
Package Type		RS14X8	EP13	EP13	

T-710-5
SCHEMATIC



T-997G & T-998G
SCHEMATIC



T-710-5 & T-997G Recommended for use with Level One LXT400 & LXT456

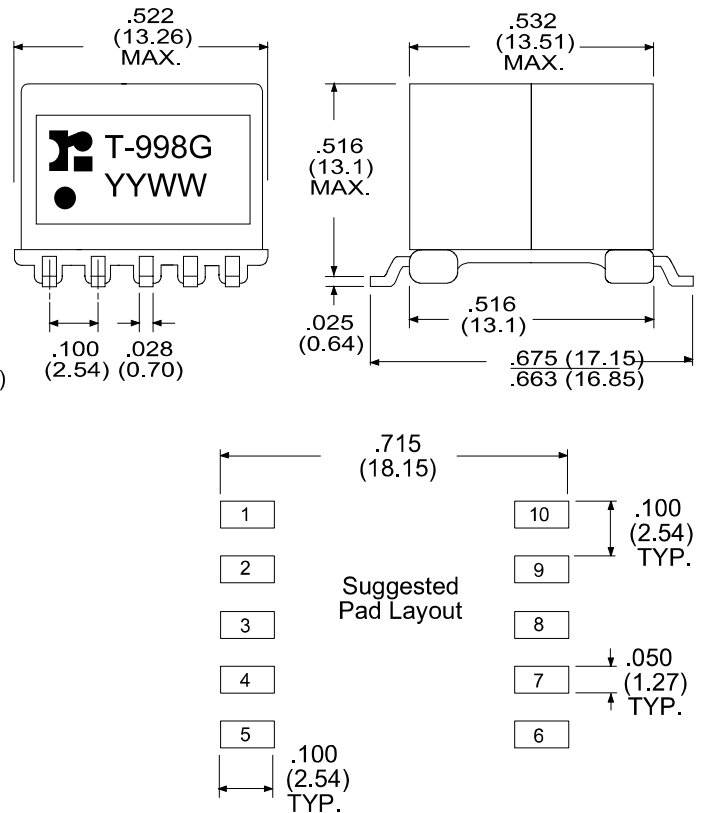
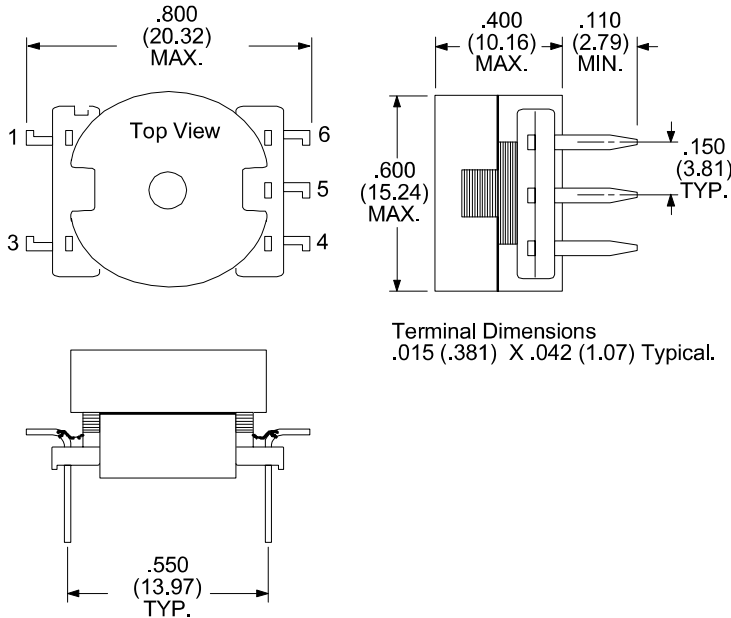
EP-13 Surface Mount Package style: T-997G & T-998G

T-998G Recommended for use with Level One LXT441

Thru-hole versions Available for T-997 & T-998
Refer to our web page for specifications

Dimensions in Inches (mm)

T-710-5: RS-14X8 Package

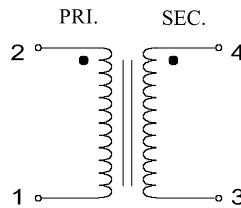


For complete details including downloadable PDF catalogs and data sheets please visit

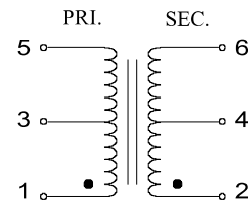
www.rhombus-ind.com

Digital Audio Data Transmission Transformers

T-10247 & T10347
SCHEMATIC



T-10252 & T-10352
SCHEMATIC



Electrical Specifications at 25°C

Parameter	"T6" Package P/N SMD Package P/N	T-10247 ⁽²⁾ T-10347	T-10252 ⁽³⁾ T-10352	Units
Turns Ratio		1:1 ± 5%	1CT:1CT ± 5%	
Inductance	100 kHz & 0.1V _{RMS}	2.5 ± 20%	5.0 ± 30%	mH
Leakage Inductance	100 kHz & 0.1V _{RMS}	0.5 max.	1.2 max.	μH
Rise Time		25 max.	25 max.	nS
DC Resistance		0.7 max.	1.0 max.	Ω
Isolation (HI-POT)		2000 min.	2000 min.	V _{RMS}
ET Product		20	25	VμS
Common Mode Rejection ⁽¹⁾		70 min.	70 typ.	dB
Return Loss	100Hz to 100kHz	15 min.	15 typ.	dB
Operating Temperature Range		-40° to +85°	0° to +70°	°C

These Transformers provide excellent DC isolation and common mode noise rejection

Designed to improve and maintain the balance of the transmitter and receiver circuitry.

Designed for low cost.

High voltage isolation

Available in Surface Mount Versions

Custom Designs and Variations of these transformers available

1. @ 1MHz in 100Ω System
2. **T-10247:** For Use with Crystal Semiconductor's integrated circuits CS8401, CS8402.
For Surface Mount Version Order Part Number T-10347
3. **T-10252:** For Use with Echelon Neuron integrated circuits 3120 and 3150 Chips produced by Motorola and Toshiba.
For Surface Mount Version Order Part Number T-10352

Flammability:

Materials used in the production of these units meet requirements of UL94-VO & IEC 695-2-2 needle flame test.

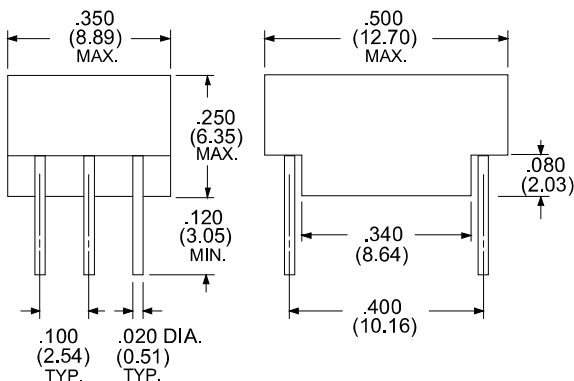
Parts shipped in anti-static tubes.
50 pieces per tube

Physical Dimensions
in inches (mm)

(Unused Pins Omitted)

"T6" Package

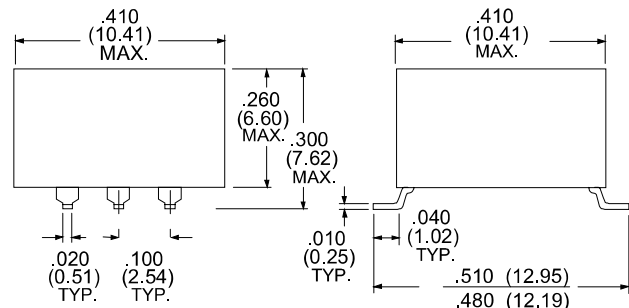
T-10247 & T-10252



Surface Mount Package

T-10347 & T-10352

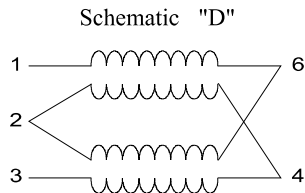
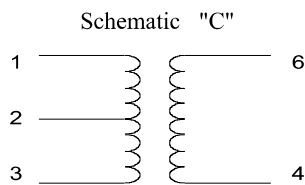
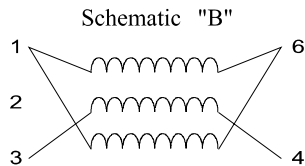
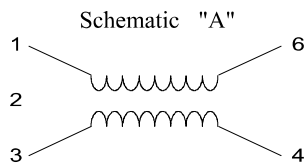
Tape & Reel Available



For complete details including downloadable
PDF catalogs and data sheets please visit
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PT21

Surface Mount Balun Transformers



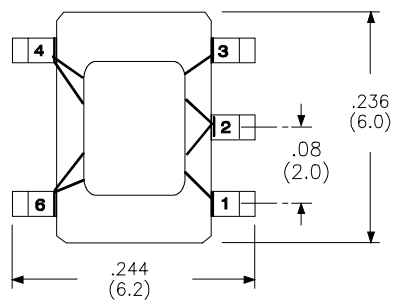
Electrical Specifications at 25°C

Part Number	Number of Turns	Operating Frequency Range (MHz)	Insertion Loss (dB)	Schem.	Application
T-948	1 1/2	5.5 - 80	3	A	Balun Transformer
T-949	2 1/2	2.5 - 200	3	A	Balun Transformer
T-950	3 1/2	1.5 - 170	3	A	Balun Transformer
T-951	4 1/2	0.8 - 140	3	A	Balun Transformer
T-952	5 1/2	0.6 - 130	3	A	Balun Transformer
T-1080	1 1/2	160 - 220	3	B	Balun Transformer
T-1081	2 1/2	55 - 170	3	B	Balun Transformer
T-1082	3 1/2	30 - 140	3	B	Balun Transformer
T-1083	1 1/2	30 - 85	3	D	Double Balanced Mixer
T-1084	2 1/2	6.5 - 100	3	D	Double Balanced Mixer
T-1085	3 1/2	3.5 - 160	3	D	Double Balanced Mixer
T-1086	4 1/2	2.5 - 150	3	D	Double Balanced Mixer
T-1087	1	10 - 55	3	C	Frequency Mixer
T-1088	2	8 - 55	3	C	Frequency Mixer
T-1089	3	3.5 - 50	3	C	Frequency Mixer
T-1090	4	2 - 37	3	C	Frequency Mixer
T-1091	1	10 - 55	3	C	Frequency Mixer
T-1092	2	50 - 85	3	C	Frequency Mixer
T-1093	3	24 - 50	3	C	Frequency Mixer
T-1094	4	10 - 38	3	C	Frequency Mixer

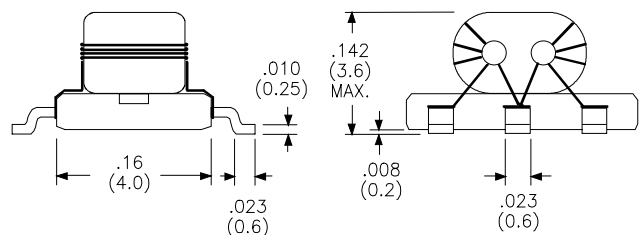
Small footprint - Surface Mount

Balun transformers can be used for impedance matching, power combining, signal splitting, frequency mixing, as frequency multipliers and as directional couplers.

For complete details including downloadable PDF catalogs and data sheets please visit www.rhombus-ind.com



Physical Dimensions inches (mm)



Wideband RF Impedance Matching Transformers

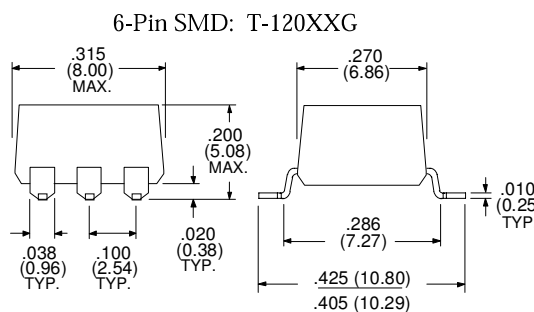
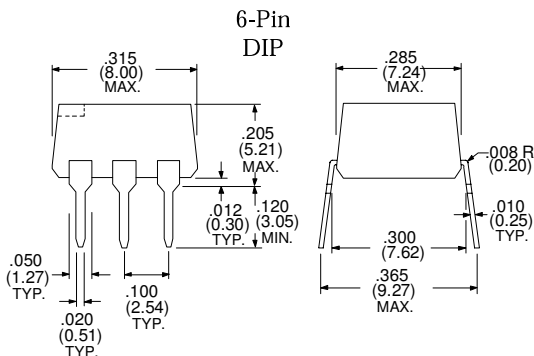
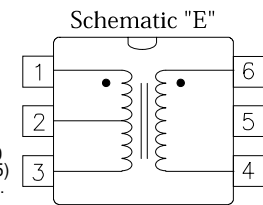
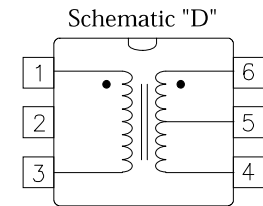
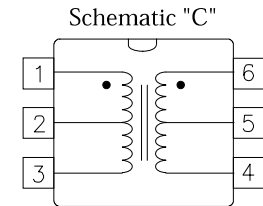
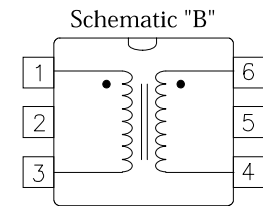
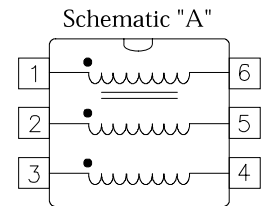
Designed for use in 50 Ω Impedance RF, and Fast Rise Time, Pulse Applications.

Isolation 500V_{RMS} minimum • Operating Temperature Range: +0 to +70 °C

Electrical Specifications at 25° C

DIP Part No.	Impedance Ratio (± 5%)	Schem. Style	Pri. Ind. min. (μH)	Rise Time max. (ns)	L _L max. (μH)	Pri./Sec. C _{w/w} max. (pF)	Pri. DCR max. (Ω)	Sec. DCR max. (Ω)	-3 dB Loss Low MHz	High MHz
T-12001	1:1	B	80	2.2	0.15	12	0.20	0.20	0.05	110
T-12002	1CT:1CT	C	80	3.0	0.18	15	0.20	0.20	0.05	90
T-12003	1:1CT	D	80	3.0	0.18	15	0.20	0.20	0.05	90
T-12004	1:1:1	A	40	2.0	0.10	12	0.16	0.16	0.10	150
T-12005	1:4	B	40	3.0	0.14	15	0.20	0.30	0.10	110
T-12006	1:4CT	D	40	3.0	0.14	15	0.20	0.30	0.10	110
T-12007	1:2	B	80	4.0	0.30	18	0.20	0.30	0.05	50
T-12008	1:2CT	D	80	3.0	0.20	18	0.20	0.30	0.05	80
T-12009	1:16	B	20	6.0	0.10	10	0.20	0.60	0.20	60
T-12010	1:16CT	D	20	6.0	0.10	10	0.20	0.60	0.20	60

DIP Part Number	Impedance Ratio	Frequency Range (MHz)			Schematic Style
		Insertion Loss 3 dB	Insertion Loss 2 dB	Insertion Loss 1 dB	
T-12050	1:1	.050-200	.080-150	.20-80	D
T-12051	1:1	.003-300	.010-150	.02-50	D
T-12052	2:1	.070-200	.100-100	.50-50	D
T-12053	2.5:1	.010-100	.020-50	.05-20	D
T-12054	3:1	.050-250	.100-200	.50-70	D
T-12055	4:1	.200-350	.350-300	2-100	D
T-12056	4:1	.020-250	.050-150	.10-100	D
T-12057	5:1	.300-300	.600-200	.50-100	D
T-12058	8:1	.030-140	.100-90	1-60	D
T-12059	13:1	.300-120	.700-80	5-20	D
T-12060	16:1	.030-75	.060-30	10-20	D
T-12061	1:1	.150-400	.350-200	2-50	B
T-12062	1:1	.010-150	.020-100	.005-50	B
T-12063	1.5:1	.100-300	.200-150	.50-80	B
T-12064	1.5:1	.020-100	.050-50	.10-25	B
T-12065	2.5:1	.010-100	.020-50	.05-20	B
T-12066	4:1	.020-200	.050-150	.10-100	B
T-12067	9:1	.150-200	.300-150	2-40	B
T-12068	16:1	.300-120	.700-80	.50-20	B
T-12069	36:1	.030-20	.050-10	.10-5	B
T-12070	1:1	.004-500	.020-200	.10-50	C
T-12071	1.5:1	.075-500	.200-100	.10-50	C
T-12072	2.5:1	.010-50	.025-25	.05-10	C
T-12073	4:1	.050-200	.200-50	1-30	C
T-12074	25:1	.020-30	.050-20	.10-10	C



Add "G" to P/N for SMD
Tape & Reel available

Multi-Purpose Single Transformers

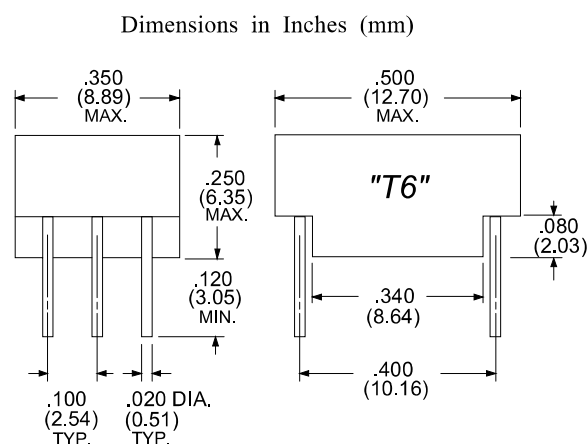
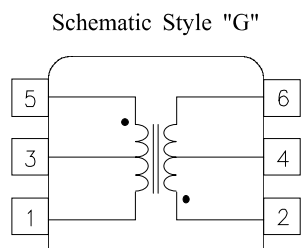
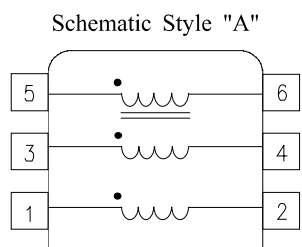
Offered in a Wide Range of Inductances and Turns Ratios, suited for a variety of requirements including LAN Networking and other Data Communications applications.

Electrical Specifications at 25°C ⁽¹⁾

Part Number	Turns Ratio ($\pm 5\%$)	OCL min. (μH)	Min. Pri. ET-Const. ($\text{V}\text{-}\mu\text{sec}$)	Rise Time max. (ns)	Pri-Sec C_{www} max. (pF)	Leakage Inductance max. (μH)	Pri DCR max. (Ω)	Schem. Style
T-50100	1:1:1	5000	25.0	10.5	60	1.3	3.9	A
T-50101	1:1:1	2000	16.0	8.2	37	0.8	2.5	A
T-50102	1:1:1	500	8.5	5.3	32	0.4	1.3	A
T-50103	1:1:1	200	5.0	4.2	18	0.3	0.9	A
T-50104	1:1:1	50	5.2	5.6	18	0.5	1.3	A
T-50105	1:1:1	20	3.2	4.1	21	0.4	0.9	A
T-50106	1:1:1	10	3.7	5.1	22	0.5	0.9	A
T-50109	1CT:1CT	5000	25.0	10.5	60	1.3	3.9	G
T-50110	1CT:1CT	2000	16.0	8.2	37	0.8	2.5	G
T-50111	1CT:1CT	500	8.5	5.3	32	0.4	1.3	G
T-50112	1CT:1CT	200	5.0	4.2	18	0.3	0.9	G
T-50113	1CT:1CT	50	5.2	5.6	18	0.5	1.3	G
T-50114	1CT:1CT	20	3.2	4.1	21	0.4	0.9	G
T-50115	1CT:1CT	10	3.7	5.1	22	0.5	0.9	G
T-50117	2CT:1CT	5000	25.0	10.5	60	1.3	3.9	G
T-50118	2CT:1CT	2000	16.0	11.0	19	1.8	2.5	G
T-50119	2CT:1CT	500	8.5	5.6	12	1.2	1.4	G
T-50120	2CT:1CT	200	5.0	3.2	8	0.8	0.9	G
T-50121	2CT:1CT	50	5.2	5.2	12	1.3	1.3	G
T-50122	2CT:1CT	20	5.8	7.5	12	1.5	1.3	G
T-50123	2CT:1CT	10	3.7	4.5	9	1.5	0.9	G

1. High Potential Test 1000 Vrms min.

Variations in schematics, electrical parameters and lead lengths are available. Consult factory.



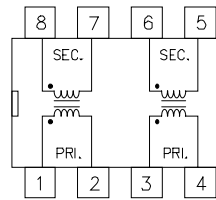
For complete details including
downloadable PDF catalogs
and data sheets please visit
www.rhombus-ind.com

Dual & Triple Multi-Purpose Transformers

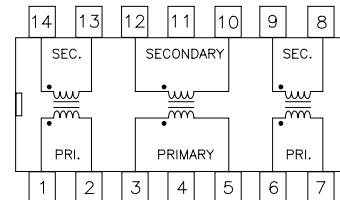
Fast Rise Times - High Isolation 2000 Vrms
 Economical Density: 2 or 3 Per Package
 Transfer Molded DIP / SMD Packages

Electrical Specifications at 25° C

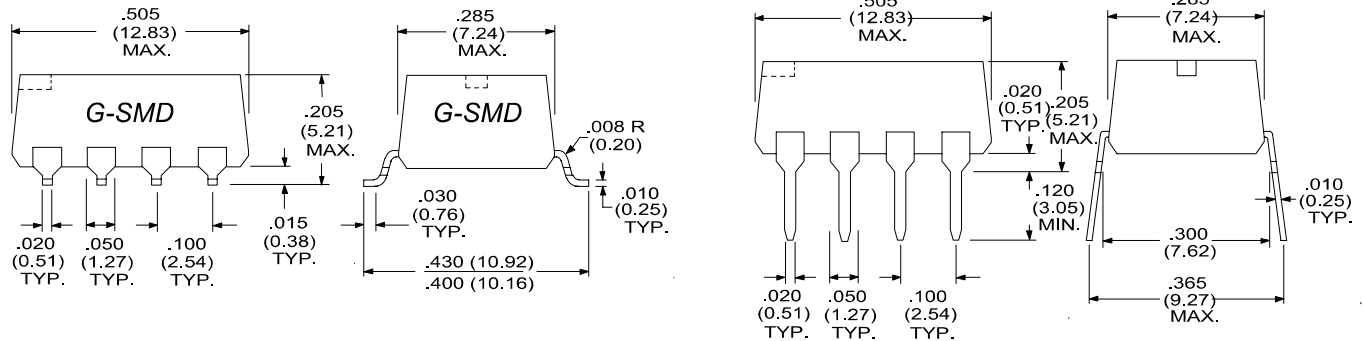
Dual Schematic



Triple Schematic



Dual 8 Pin Part No.	Triple 14 Pin Part No.	Turns Ratio (± 5%)	OCL (± 20%) (μH)	E-T min. V-μS	Rise Time max. (ns)	Pri./Sec. C _{ww} max. (pF)	L _L max. (μH)	DCR max. (Ω)
T-11400	T-10700	1:1	30	1.8	3.0	8	0.20	0.20
T-11401	T-10701	1:1	35	1.8	3.0	8	0.20	0.20
T-11402	T-10702	1:1	50	2.1	3.0	9	0.20	0.20
T-11403	T-10703	1:1	75	2.3	3.0	10	0.20	0.25
T-11404	T-10704	1:1	80	2.3	3.0	10	0.20	0.25
T-11405	T-10705	1:1	100	2.7	3.5	10	0.20	0.25
T-11406	T-10706	1:1	150	3.0	3.5	12	0.25	0.30
T-11407	T-10707	1:1	200	3.5	3.5	15	0.25	0.40
T-11408	T-10708	1:1	250	3.5	3.5	15	0.25	0.40



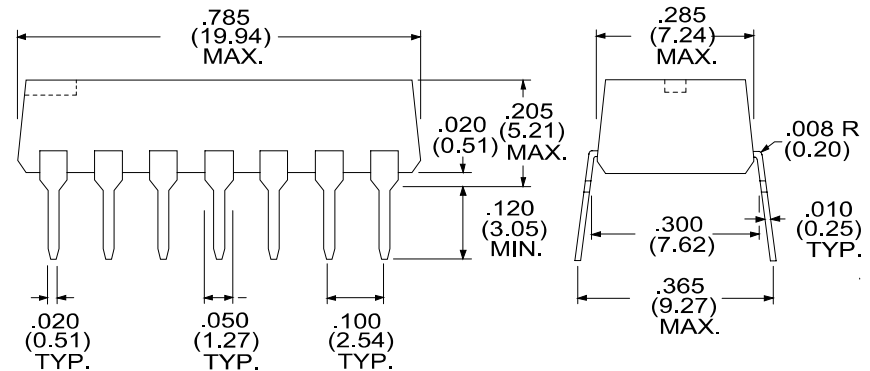
SMD versions available
on Tape & Reel

Dimensions in Inches (mm)

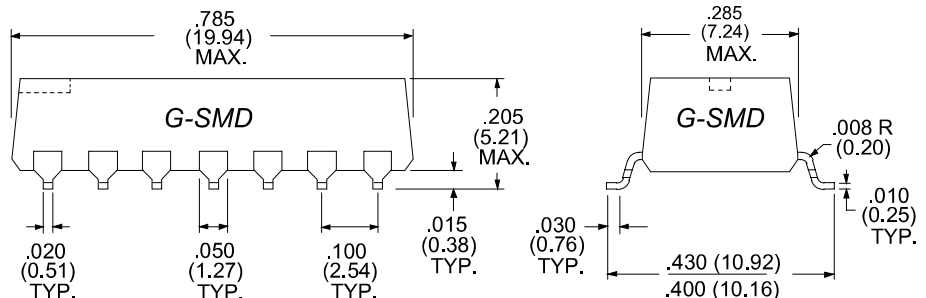
To Specify G-SMD Package
add "G" Suffix to part numbers
from Table above.

Examples:

- T-10702 = 14-pin DIP
- T-10702G = 14-pin G-SMD
- T-11402 = 14-pin DIP
- T-11402G = 14-pin G-SMD



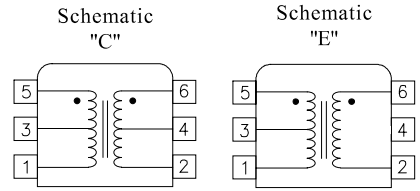
For complete details including
downloadable PDF catalogs
and data sheets please visit
www.rhombus-ind.com



Pulse Transformers for Maxim "MAX253"

Thru-hole & Surface Mount

RS-485 Data Interface Applications
RS-232 Data Interface Applications
1800 V_{RMS} Minimum Isolation
Custom Designs and Variations on
electrical data available



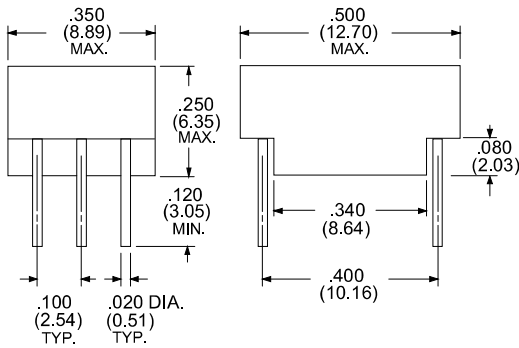
Electrical Specifications ^{1,2} at 25°C

T6-Pkg. Part Number	Wide-SMD Part Number	Turns Ratio (± 5 %)	OCL min. (mH)	PRI-SEC C _{w/w} max. (pF)	Leakage L _L max. (μH)	Pri. DCR max. (Ω)	Sec. DCR max. (Ω)	ET * min. (V-μS)	Schem. Style
T-941	T-971	1CT:1	1.2	45	0.6	0.7	0.7	20	E
T-942	T-972	1CT:1.3CT	1.2	45	0.6	0.7	0.9	20	C
T-943	T-973	1CT:2.1CT	0.8	35	0.4	0.6	1.4	12	C
T-944	T-974	1CT:5CT	1.2	45	0.6	0.7	3.5	20	C
T-945	T-975	1CT:1CT	1.2	45	0.6	0.7	0.7	20	C

1. Primary Pins for all parts listed are pins 1-5.
2. Temp range is -40°C to +85°C

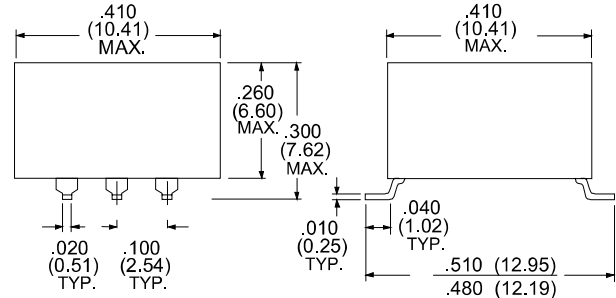
* **Due to High ET Product, these parts are recommended for all applications where FS is High, Open, or Low.**

"T6" Package
T-941 thru T-945



Physical Dimensions
inches (mm)

Wide-SMD Package
T-971 thru T-975



SMD available on Tape & Reel

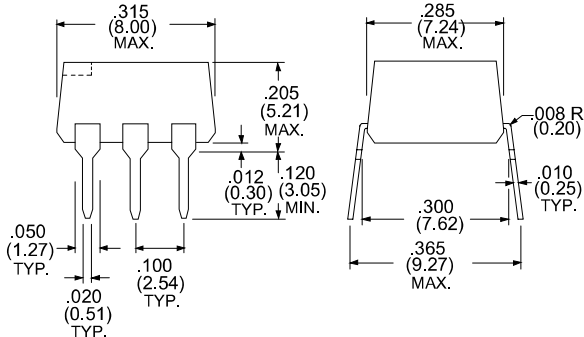
Electrical Specifications ^{1,2} at 25°C

DIP Part Number	SMD Part Number	Turns Ratio (± 5 %)	OCL min. (mH)	PRI-SEC C _{w/w} max. (pF)	Leakage L _L max. (μH)	Pri. DCR max. (Ω)	Sec. DCR max. (Ω)	ET ** min. (V-μS)	Schem. Style
T-1106	T-1106G	1CT:1	1.2	60	0.8	0.8	0.8	12	E
T-1107	T-1107G	1CT:1.3CT	1.2	60	0.8	0.8	1.0	12	C
T-1108	T-1108G	1CT:2.1CT	0.8	50	0.6	0.7	1.6	8	C
T-1110	T-1110G	1CT:1CT	1.2	60	0.8	0.8	0.8	12	C

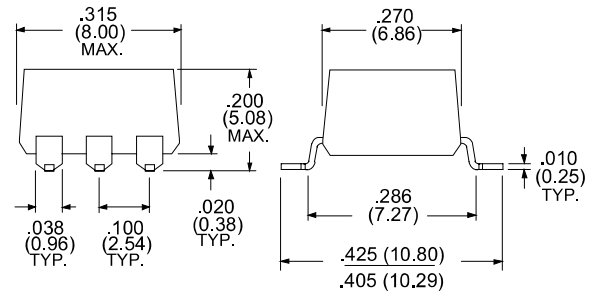
1. Primary Pins for all parts listed are pins 1-5.
2. Temp range is -40°C to +85°C

** **Due to lower ET Product, these parts are only recommended for applications where FS is High or Open.**

6-Pin DIP Package
T-941 thru T-945



6-Pin SMD Package T-1106G thru T-1110G



SMD available on Tape & Reel

For complete details including downloadable PDF catalogs and data sheets please visit
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PT21

Magnetic Product Families from Rhombus Industries

Telecommunications

ISDN
T1 / CEPT
HDSL, ADSL

Pulse Transformers

General Purpose
Impedance Matching
Isolation
SCR Trigger

Inductors

Toroidal • Radial Lead
Chokes • Air Coils

Audio Transformers

Modem Couplers
Telephone Coupling
Voiceband Repeat Coils
Voice / Data • Dry / Wet
Hybrids

LAN Products

Ethernet • StarLan
10Base-T • Token Ring

Switched Mode Magnetics

Chokes - Common Mode
& Differential Mode
Output Inductors
Drive Transformers
Current Sense Transformer

Delay Lines

Passive (Electromagnetic)
Active (Logic Buffered)
Tapped / Multi
Programmables
Pulse Control / Oscillators
FAST & Schottky TTL
Low Voltage CMOS
ECL 10K-10KH-100K

RF Filters

10Base-T
Signal Line • High Q

Power Magnetics

50/60 Hz • 400 Hz
Low Profile
Smoothing Chokes
Line Chokes
1 Watt to 1 kW

- *Off-the-Shelf Variety of Schematics & Geometries*
- *Open Case, Epoxy Encapsulated, and Transfer Molded Packages*
- *Thru-hole & SMD Versions*
- *Samples Shipped from Stock or in 1-2 weeks at No Cost for most products*

Catalogs, Datasheets & Application notes for download in PDF format

www.rhombus-ind.com

Services & Capabilities

Standard Product Line

Broad range of Magnetic Products as listed in our various catalogs.

Coil Winding

Toroidal, Bobbin, Air Coil types. Wide range of gauges. Machine and hand wound.

Custom Designs

We welcome designs customized to your specific requirements.

Expedited Turn-around

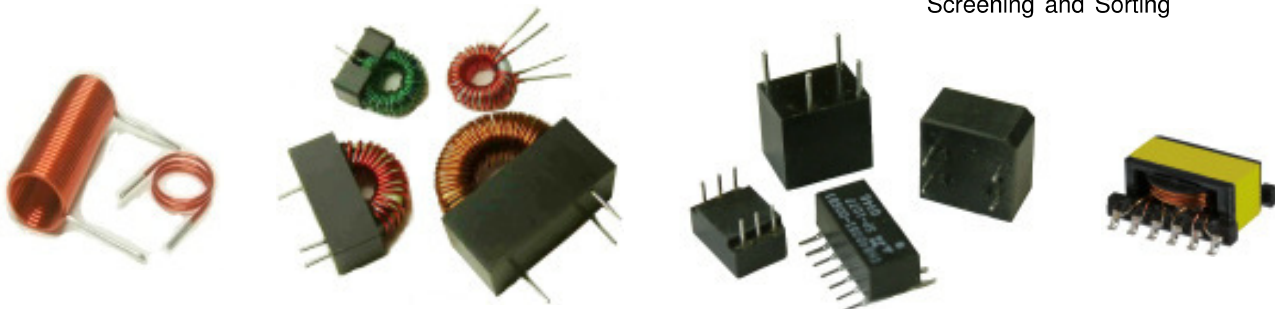
For Critical needs Rhombus can often provide faster than standard lead times.

Cross Referencing

Rhombus can cross reference your current supplier part numbers.

Environmental and Electrical Test Capabilities

Thermal Shock, and Life Test
Humidity / Temperature Testing
Electrical Parameter Characterization
Screening and Sorting



 **Rhombus Industries Inc.**
Transformers & Magnetic Products