

# ADSL MAGNETICS

For Alcatel MTK 20130/20140/20150



TM00300

- Isolation transformers are designed to meet IEC 950 and UL 1950 safety requirements for supplementary insulation at 250V
- Operating temperature range: -40° C to +85° C
- Meets IEC 695, 2-2 flammability requirements
- PWB Process Capability: standard printed wiring board assembly techniques, total-immersion cleaning
- Reliability testing: shock, vibration, temperature cycling, temperature - humidity - bias

## ELECTRICAL SPECIFICATIONS AT 25° C

### Individual Receive and Transmit Transformers for Hybrid Circuit (CO)

Part Number	Application	Package	Turns Ratio <sup>1</sup> ±1%			Inductance <sup>2</sup> mH	Leakage Inductance <sup>3</sup> µH max	DCR Ω max			Dielectric Rating <sup>4</sup> Vrms  between (2-5) & (1-4)
			(2-5) : (1-6)	(2-5) : (3-4)	(1-6) : (3-4)			(1-6)	(1-6)	(2-5)	
0560-6600-C5	RX	THT	2.25	4.50	2.00	1.5	2	0.85	0.47	0.26	600
S560-6600-G3	RX	SMD	2.25	4.50	2.00	1.5	2	0.85	0.47	0.26	600
0560-6600-C6	TX	THT	1.125	2.25	2.00	1.5	1.8	0.42	0.42	0.26	600
S560-6600-G2	TX	SMD	1.125	2.25	2.00	1.5	1.8	0.42	0.42	0.26	600
0560-6600-K3	RX	THT	3.50	7.00	2.00	1.33	2.0	0.95	0.29	0.17	600
S560-6600-K4	RX	SMD	3.50	7.00	2.00	1.33	2.0	0.95	0.29	0.17	600
0560-6600-K5	TX	THT	1.125	2.25	2.00	1.33	1.8	0.25	0.30	0.13	600
S560-6600-K6	TX	SMD	1.125	2.25	2.00	1.33	1.8	0.25	0.30	0.13	600

1. measured at 10 kHz, 1 Vrms

2. measured at 10kHz, 0.1 Vrms

3. connect terminals 2 to 5, 100 kHz, 0.1 Vrms

4. connect terminals 6 to 3

### Integrated Receive and Transmit Transformer Package (CO)

Part Number	Package	Turns Ratio <sup>1</sup> ± 2%				Inductance <sup>2</sup>		DCR Ω max				Dielectric Rating  between (1-5) & (6-7) (1-5) & (2-4) (1-5) & (10-9)
		(1-3) : (6-7)	(5-3) : (10-9)	(1-3) : (2-8)	(5-3) : (4-8)	(3-5) = (2-8)	(3-1) = (8-4)	(6-7)	(1-3) = (8-4)	(3-5) = (2-8)	(10-9)	
S560-6600-K8	SMD	7.0	1.125	2.00	2.00	1.2 mH	3.07 µH	1.80	0.45	0.70	1.10	1000 Vrms
S560-6600-A6	SMD	4.5	1.125	2.00	2.00	580	-	1.55	0.45	0.60	1.10	1500 Vrms

1. 10 kHz, 1 Vrms

2. 10 kHz, 0.1 Vrms

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**Isolation Transformers (CO & CPE)**

Part Number	Application	Package	Turns Ratio $\pm 2\%$		Inductance <sup>1</sup>	Leakage Inductance	DCR $\Omega$ max		Direct Capacitance	Dielectric Rating
			Line : Chip	Line Side	$\mu\text{H}$	$\mu\text{H}$ max	Line Side	Chip Side	pF	Vrms typ
0560-6600-25	CPE	THT	1 : 1		442	10	0.9	1.1	45 max	1500
S560-6600-40	CPE	SMD	1 : 1		480	8	1.25	1.35	55 typ	1500
0560-6600-L9	CPE <sup>2</sup>	THT	1 : 1		108	8	1.2	1.3	70 typ	1500
S560-6600-M1	CPE <sup>2</sup>	SMD	1 : 1		108	8	1.2	1.3	70 typ	1500
0560-6600-C7	CO	THT	2 : 1		410	3.5	0.64	0.4	65 max	1500
S560-6600-G1	CO	SMD	2 : 1		410	3.5	0.64	0.4	65 max	1500
0560-6600-80	CO	THT	2 : 1		410	3	0.7	0.4	65 max	1500
S560-6600-81	CO	THT	2 : 1		410	3	0.7	0.4	65 max	1500
0560-6600-26	CO	THT	2 : 1		410	6.5	0.64	0.38	40 max	1500

1. measured at 10 kHz, 1 Vrms
2. ADSL over ISDN application

**Dual Mode Receive or Transmit Transformers for Hybrid Circuit (CO)**

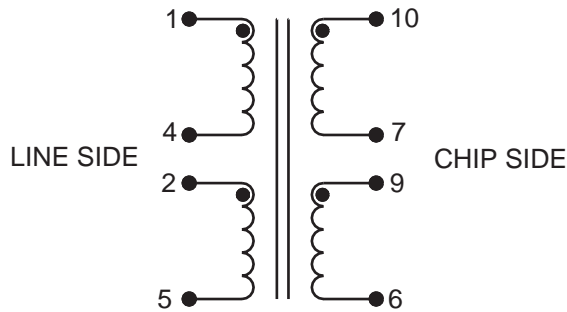
Part Number	Application	Package	Turns Ratio <sup>1</sup>		Inductance <sup>2</sup>	Leakage Inductance <sup>3</sup>	DCR $\Omega$ max		Direct Capacitance <sup>4</sup>	Dielectric Rating <sup>5</sup>
			(7-2) : (6-3)	(7-2) : (5-4)	$\mu\text{H}$ min	$\mu\text{H}$ max	(2-7)	(3-5)	pF max	Vac
S560-6600-J2	RX or TX	SMD	2.25	4.50	844	0.6	400	310	25	1500
0560-6600-49	RX or TX	THT	2.25	4.50	844	0.6	400	310	25	1500

1. measured at 100 kHz, 1 Vrms
2. measured at 100 kHz, 0.1 Vrms
3. short terminals 7 to 2, 500 kHz, 0.1 Vrms
4. short terminals 4 to 6, 100 kHz, 1 Vrms
5. short terminals 4 to 6, 50 Hz or 60 Hz

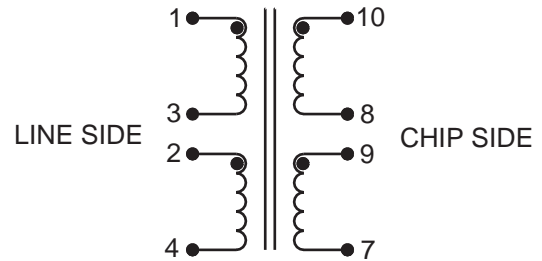
**ADSL MAGNETICS**  
For Alcatel MTK 20130/20140/20150

**SCHEMATIC**

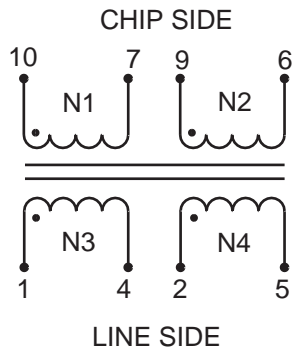
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**S560-6600-G1**  
**0560-6600-L9**  
**S560-6600-M1**



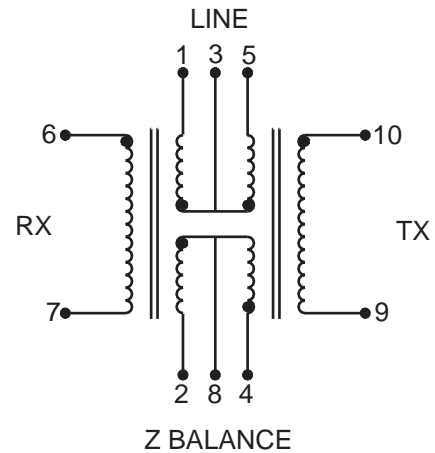
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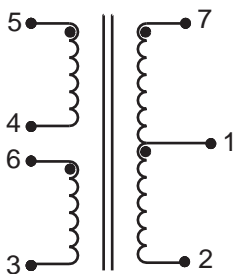
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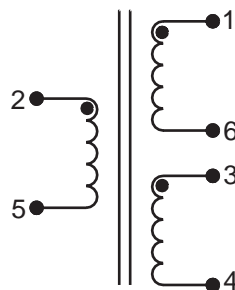
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**S560-6600-A6**



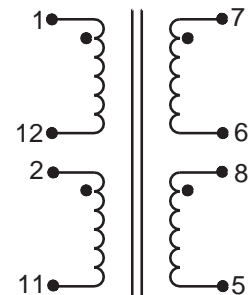
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**S560-6600-J2**



**0560-6600-C5**  
**S560-6600-G3**  
**0560-6600-C6**  
**S560-6600-G2**



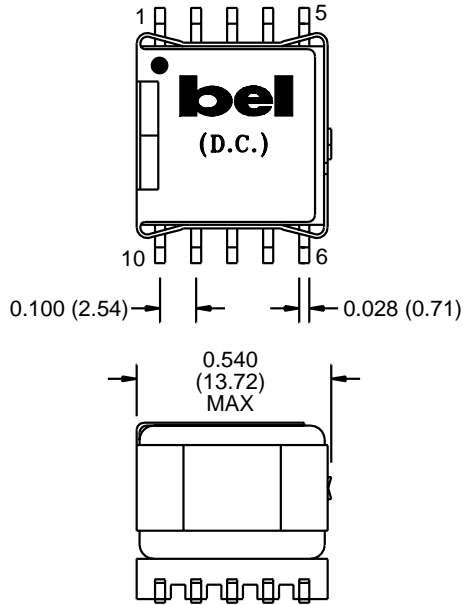
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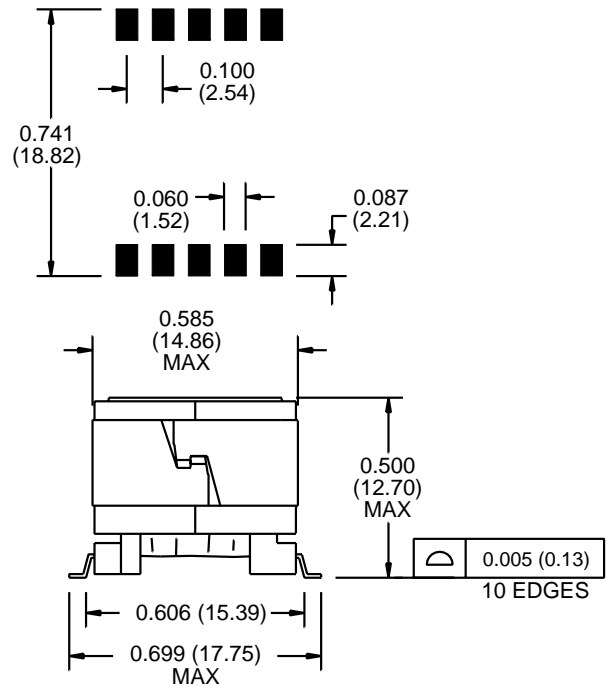
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### MECHANICAL

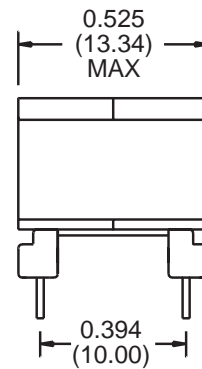
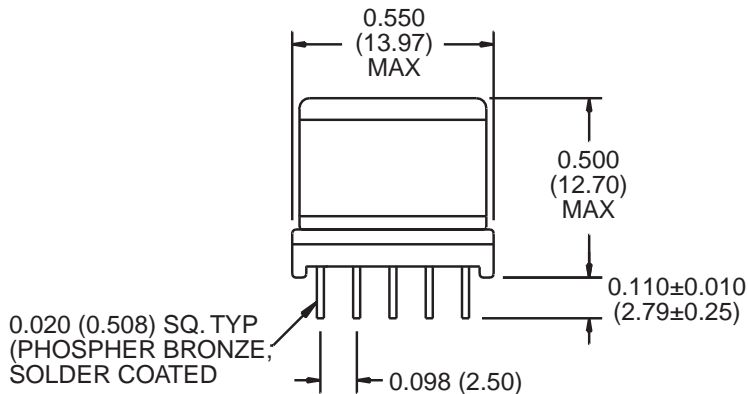
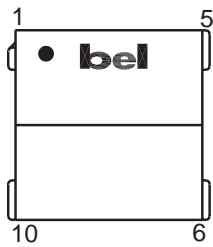
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S560-6600-M1



### SUGGESTED PCB PAD LAYOUT



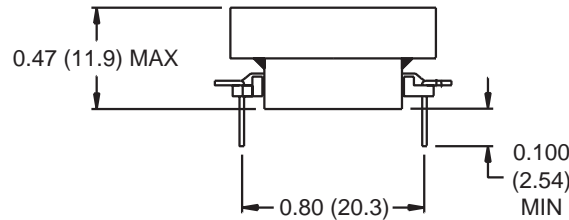
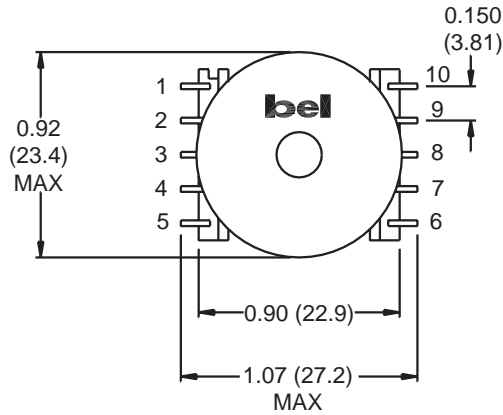
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0560-6600-C7  
0560-6600-L9



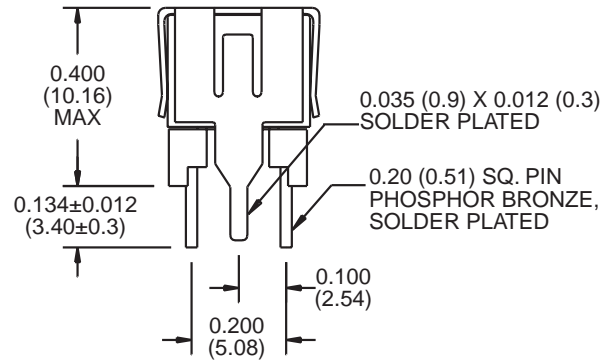
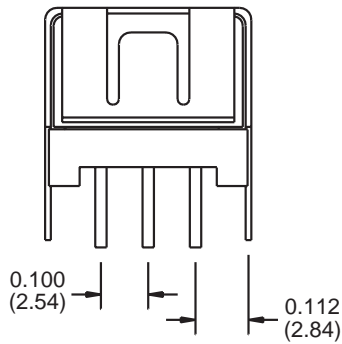
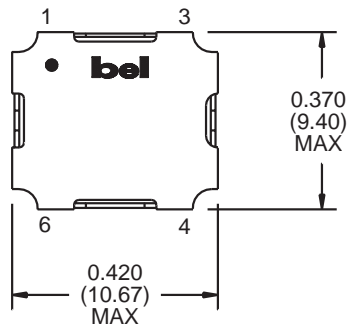
**ADSL MAGNETICS**  
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**MECHANICAL**

0560-6600-25



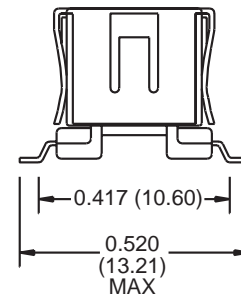
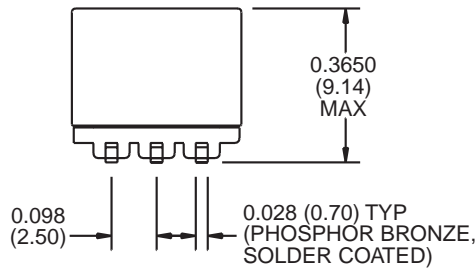
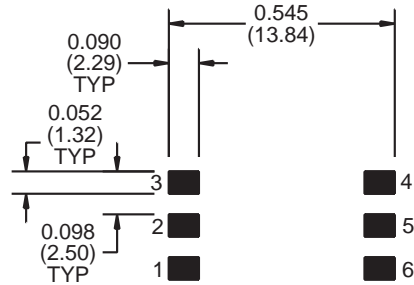
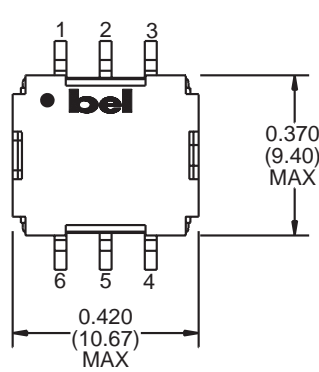
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0560-6600-C6  
0560-6600-K3  
0560-6600-K5



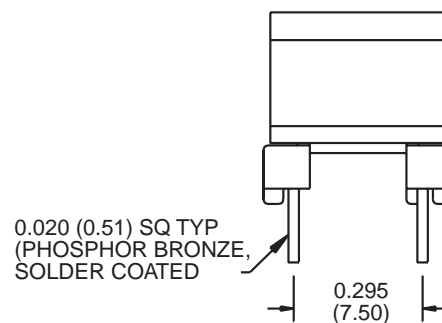
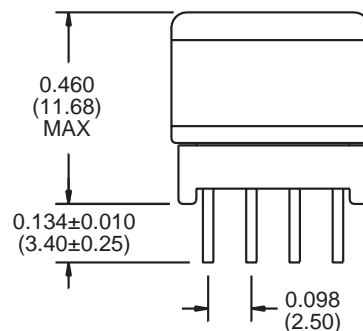
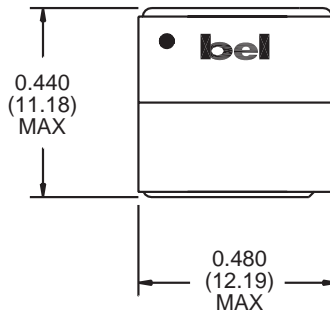
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### MECHANICAL

S560-6600-G2  
S560-6600-G3  
S560-6600-K4  
S560-6600-K6



0560-6600-49



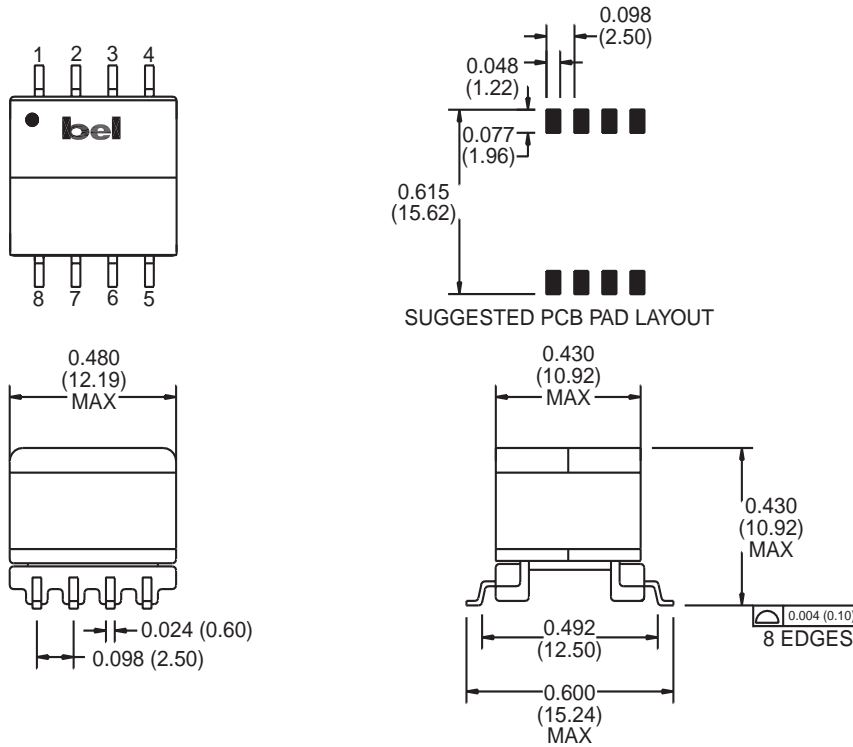
# ADSL MAGNETICS

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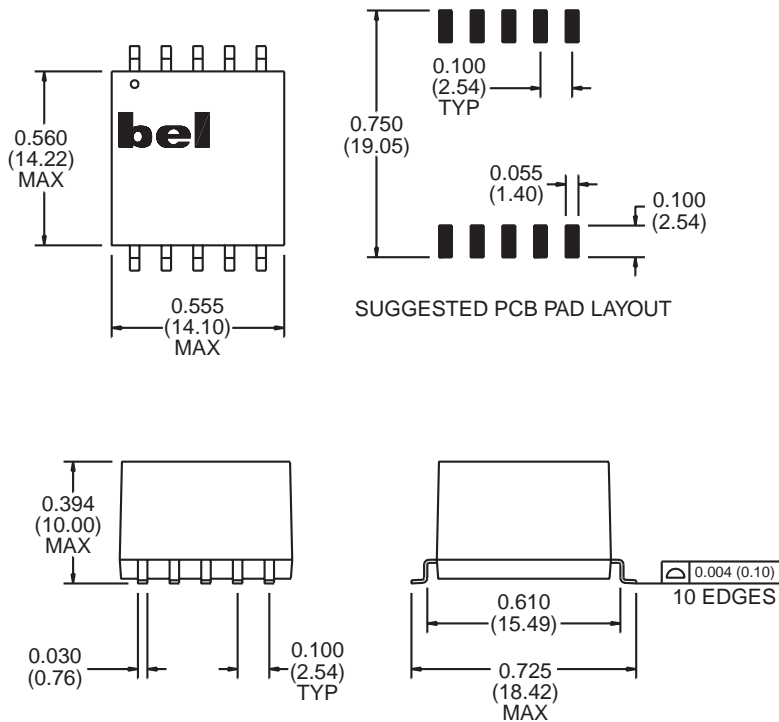
TM00300

## MECHANICAL

S560-6600-J2



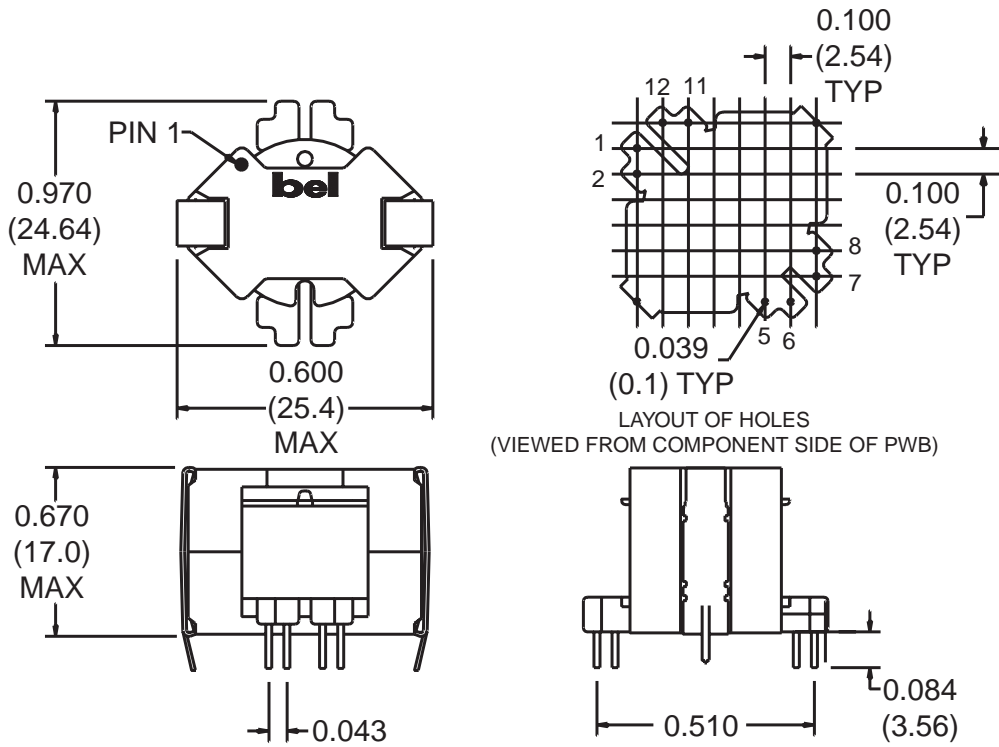
S560-6600-K8  
S560-6600-A6



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### MECHANICAL

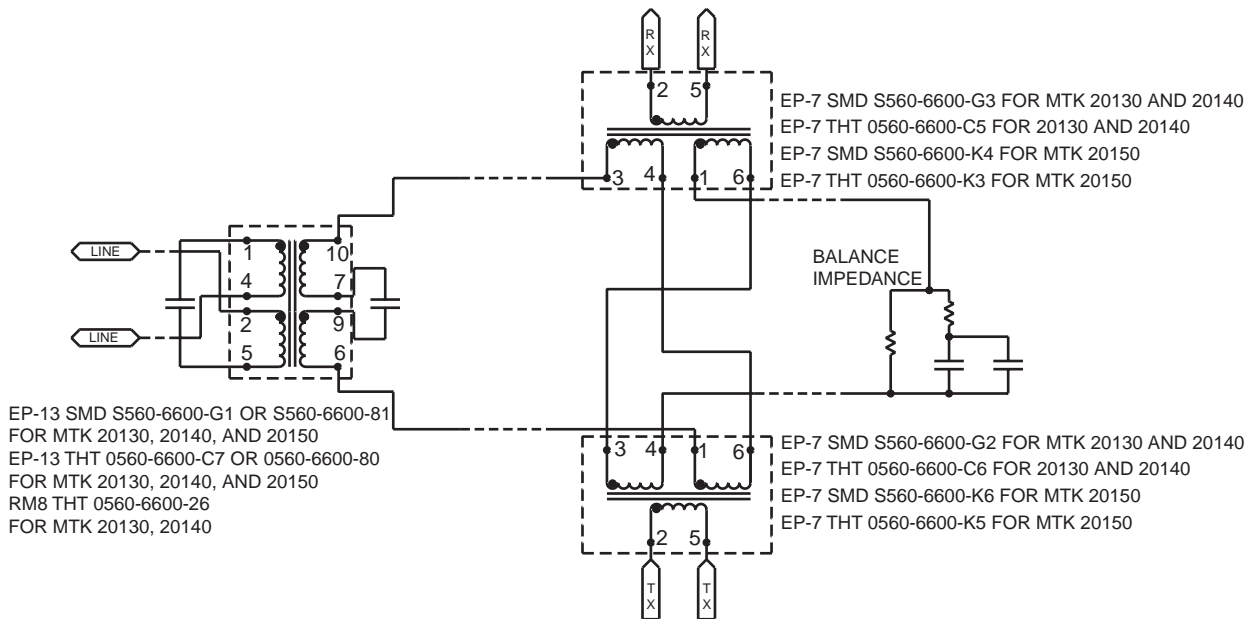
0560-6600-26



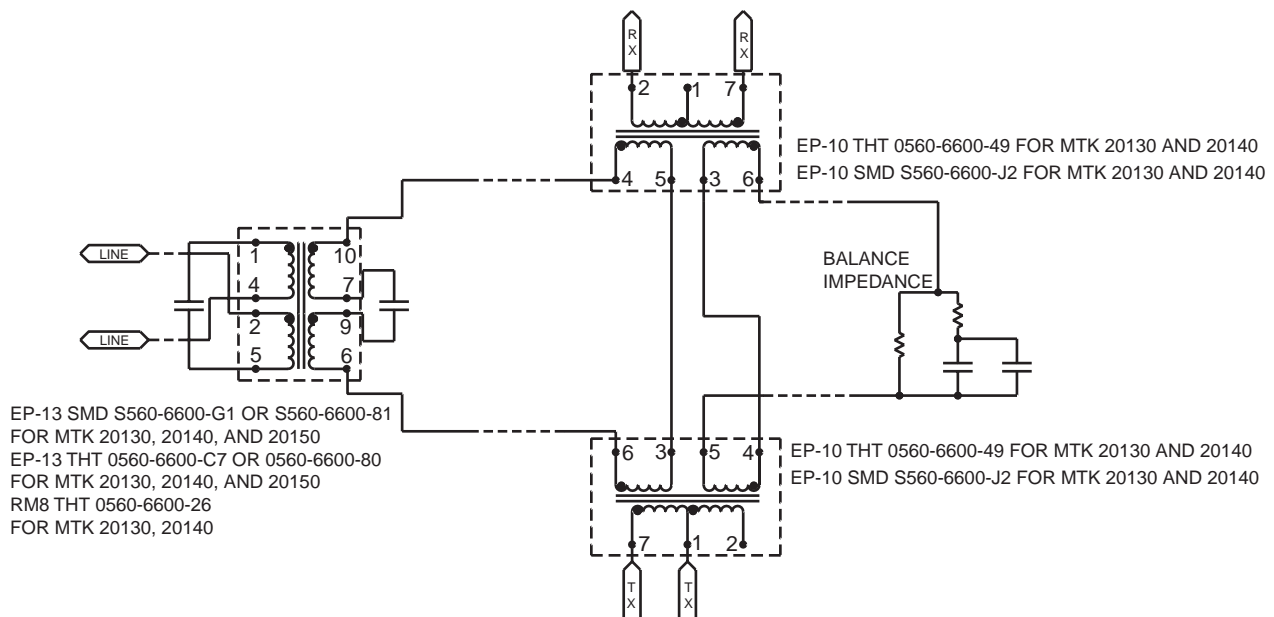


### APPLICATION CIRCUIT

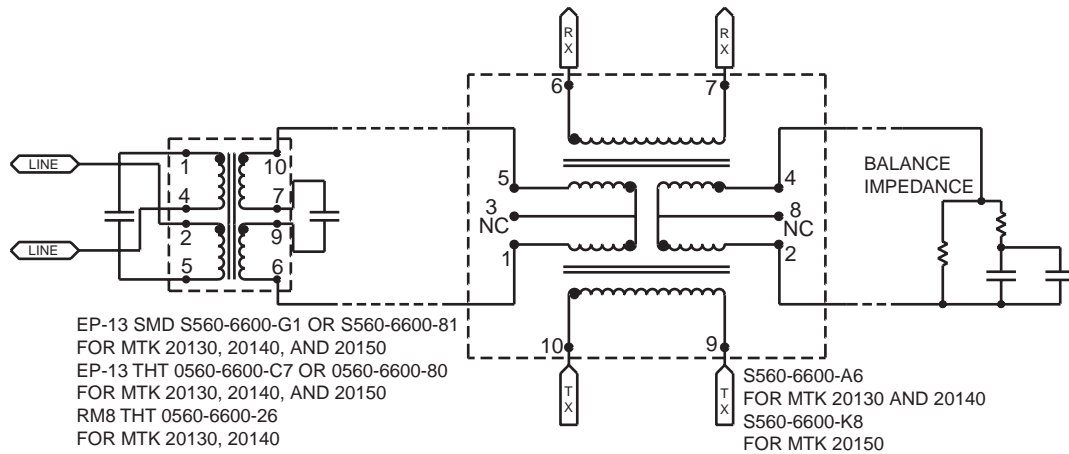
**FIGURE 1 - TYPICAL ISOLATION AND MAGNETIC HYBRID STAGES USING SMALL FOOTPRINT TRANSFORMERS FOR TRANSMIT AND RECEIVE**



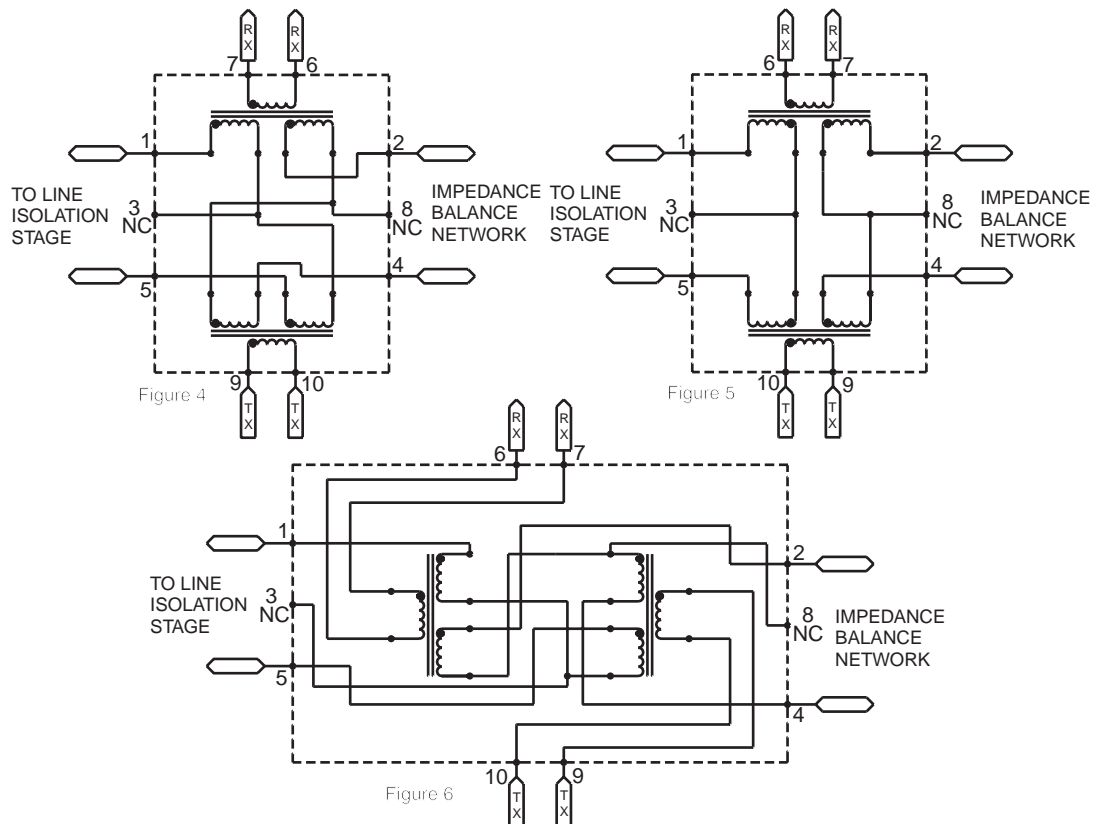
**FIGURE 2 - TYPICAL ISOLAION AND MAGNETIC HYBRID STAGES USING DUAL MODE TRANSFORMERS FOR TRANSMIT AND RECEIVE**



**FIGURE 3 - TYPICAL ISOLATION AND MAGNETIC HYBRID STAGES USING INTEGRATED RX AND TX MAGNETIC HYBRID CIRCUIT PACKAGE**



**FIGURE 4, 5, & 6 EQUIVALENT HYBRID CIRCUIT SCHEMATICS**



Application and Cross Reference List					
Application	Type	Alcatel	Chipset	Structure	Part Number
ADSL-LT (CO) & NT (CPE) Filter	500 $\mu$ H Ind	1AB 02363 0016	MTK 20130/140	EP-7 THT	0560-6100-20
	500 $\mu$ H Ind	TMP 00647 0001	MTK 20130/140	EP-7 SMD	S560-6100-24
	500 $\mu$ H Ind	-	MTK 20130/140	EP-7 THT (no tab)	0560-6600-53
	500 $\mu$ H Ind	-	MTK 20130/140	EE5	S560-6100-27
ADSL-LT (CO) & NT (CPE) Filter	91 $\mu$ H Ind	1 AB 02363 0017	MTK 20130/140	EP-7 THT	0560-6600-51
	91 $\mu$ H Ind	-	MTK 20130/140	EE5	S560-6100-22
ADSL-LT (CO) Filter	96 $\mu$ H Ind	TMP 00537 0001	MTK 20130/140	EP-7 SMD	S560-6600-G4
	96 $\mu$ H Ind	-	MTK 20130/140	EP-7 THT	0560-6600-C4
	96 $\mu$ H Ind	1 AB 06932 0017	MTK 20130/140	RM4	0560-6600-54
	96 $\mu$ H Ind	-	MTK 20130/140	EE5	S560-6100-23
ADSL-LT (CO) Hybrid TX	1 : 2 : 2.25 TX	TMP 00501 0007	MTK 20130/140	EP-7 THT	0560-6600-C6
	1 : 2 : 2.25 TX	-	MTK 20150	EP-7 THT	0560-6600-K6
	1 : 2 : 2.25 TX	TMP 00501 0020	MTK 20130/140	EP-7 SMD	S560-6600-G2
	1 : 2 : 2.25 TX	-	MTK 20150	EP-7 SMD	S560-6600-K6
ADSL-LT (CO) Hybrid RX	1 : 2 : 4.5 RX	TMP 00501 0008	MTK 20130/140	EP-7 THT	0560-6600-C5
	1 : 2 : 4.5 RX	TMP 00501 0021	MTK 20130/140	EP-7 SMD	S560-6600-G3
	1 : 2 : 7 RX	TMP 00501 0013	MTK 20150	EP-7 THT	0560-6600-K3
	1 : 2 : 7 RX	-	MTK 20150	EP-7 SMD	S560-6600-K4
ADSL-LT (CO) Hybrid RX & TX	RX or TX	1 AB 01897 0018	MTK 20130/140	EP-10 THT	0560-6600-49
	RX or TX	-	MTK 20130/140	EP-10 SMD	S560-6600-J2
ADSL-LT (CO) Hybrid RX & TX	RX & TX	-	MTK 20130/140	Topper 10	S560-6600-A6
	RX & TX	-	MTK 20150	Topper 10	S560-6600-K8
ADSL-LT (CO) Line Transformer	2 : 1 Line	1 AB 021260113	MTK 20130/140	RM8 THT	0560-6600-26
	2 : 1 Line	TMP 00530 0004	MTK 20130/140/150	EP-13 THT	0560-6600-C7
	2 : 1 Line	TMP 00530 0003	MTK 20130/140/150	EP-13 SMD	S560-6600-G1
	2 : 1 Line	-	MTK130/140/150	EP-13 THT	0560-6600-80
	2 : 1 Line	-	MTK130/140/150	EP-13 SMD	S560-6600-81
ADSL-LT (CPE) Line Transformer	1 : 1 Line	-	MTK 20130/140/150	EP-13 SMD	S560-6600-40
	1 : 1 Line	-	MTK 20130/140/150	Pot Core	0560-6600-25
	1 : 1 Line	-	MTK 20130/140	EP-13 SMD	S560-6600-M1 <sup>1</sup>
	1 : 1 Line	-	MTK 20130/140	EP-13 THT	0560-6600-L9 <sup>1</sup>

1. ADSL over ISDN application

### APPLICATION NOTES

Bel has developed a complete magnetics solution to work with Alcatel "DynaMiTe™" MTK20130, MTK20140 and MTK20140 third, fourth and fifth generation of Rate Adaptive Asymmetrical Digital Subscriber Line (ADSL) chipset designs, for central office (CO) or remote (CPE) applications, bel offer a solution for ADSL over POTS or ADSL over ISDN, Bel solution consist of :

#### Isolation Transformers

Bel offer isolation transformers for CO and CPE applications, ADSL over POTS or ADSL over ISDN. Bel isolation transformer for ADSL over POTS for CO application is available on surface mount (S560-6600-G1) or through hole (0560-6600-C7) provide POTS signal filtering from the line, it also matches the line impedance to the hybrid impedance (100Ω:25Ω). 0560-6600-25 and S560-6600-40 are the CPE alternatives for ADSL over POTS. 0560-6600-L9 and S560-6600-M1 are the ADLS over ISDN offerings. All isolation transformers meet standard safety regulation requirements per EN60950/UL1950 supplementary isolation. Isolation transformers can be used with all different Alcatel Chipsets.

#### Transmit and Receive Transformers for Hybrid Circuit

Individual SMD and TH transformers are offered for the Receive and Transmit magnetic hybrid circuit, these designs offer a smaller footprint desirable on highly populated boards. Refer to figure 1 for a typical implementation using small footprint transformers. Bel offers a complete range of transmit and receive transformers for Alcatel MTK20130, 20140 20150 chipsets.

0560-6600-49 TH and S560-6600-J2 SMD transformers offer the flexibility to be connected as Receive or Transmit transformers on the magnetic hybrid circuit. See figure 2 for a typical circuit implementation using these transformer solution. Bel currently offer this solution for Alcatel MTK20130 & 20140 only.

#### Integrated Receive and Transmit magnetic hybrid Circuit Package.

In multi-port system applications, where board layout is limited Bel has designed a package that integrates receive and transmit transformers for the hybrid circuit (S560-6600-A6 & S560-6600-K8). These designs are four-port devices that offer in addition the required internal connections between receive and transmit transformers to conform the magnetic hybrid stage of the circuit. These designs uses toroidal magnetic cores for both receive and transmit transformers, the toroidal cores offer low cross talk features facilitating package integration, with optimum transmission characteristics and high radio frequency suppression due to shortest possible connection paths.

Figures 4, 5 & 6 depict different equivalent schematics for the magnetic hybrid circuit arrangements, all schematics presented are electrically equivalent, bel S560-6600-A6 or S560-6600-K8 are substitutes for any or all arrangements on figure 4,5 & 6 depending on the chipset used.

#### Receive and Transmit Filter Inductors.

Bel offers a an extensive line of low profile inductors to be used on transmit or receive filters for CO, CPE, ADSL over POTS or ADSL over ISDN. These designs offer good immunity to EMI noise emissions offering flexibility in high density boards. For complete range of inductance values and structures refer to the ADSL Inductors Section.

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