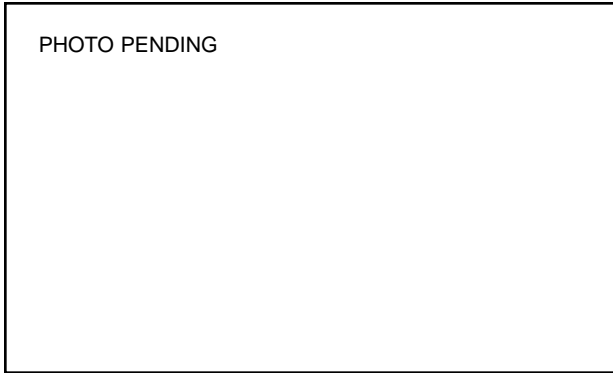


Analog Telephony / Modem Couplers



DESCRIPTION

The REMtech Magnetics ESMIT-3586 is a “Dry” Encapsulated SMT Modem Isolation Transformer suitable for up to V.90 (56 kbps) analog modem applications compliant with International safety norms.

ESMIT-3576 was designed as an optimum trade-off between Insertion Loss due to coil resistance and 56K distortion performance at 0 dBm, while also a small SMT footprint with maximum 10 mm height for pick and place. A great solution for boards with limited footprint space, and universal application for impedance matching too.

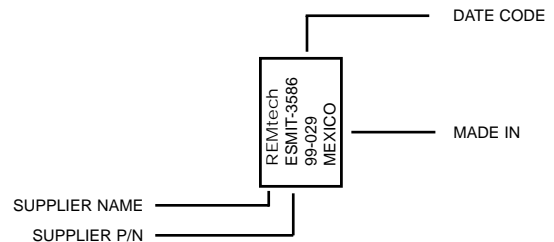
FEATURES

- Suitable for modem speeds up to V.90 (56 kbps).
- Total Harmonic Distortion measures -76 dB at 0 dBm. Rated -92 dB typ. @ 600 Hz, -10 dBm and -79 dB typ. @ 150 Hz, -3 dBm.
- Insertion Loss rated 2.60 dB typ. @ 2000 Hz.
- Complies with IEC60950 Reinforced safety norms.
- Reflects 600 Ohms on Primary with 301Ohms Secondary Load.
- Uses minimal external components for impedance matching to pan-European CTR-21 telephone lines.
- Ultra-small PCB footprint (19.0 mm x 9.6 mm).
- Very Low-Profile (10.0 mm).
- SMT pin configuration.

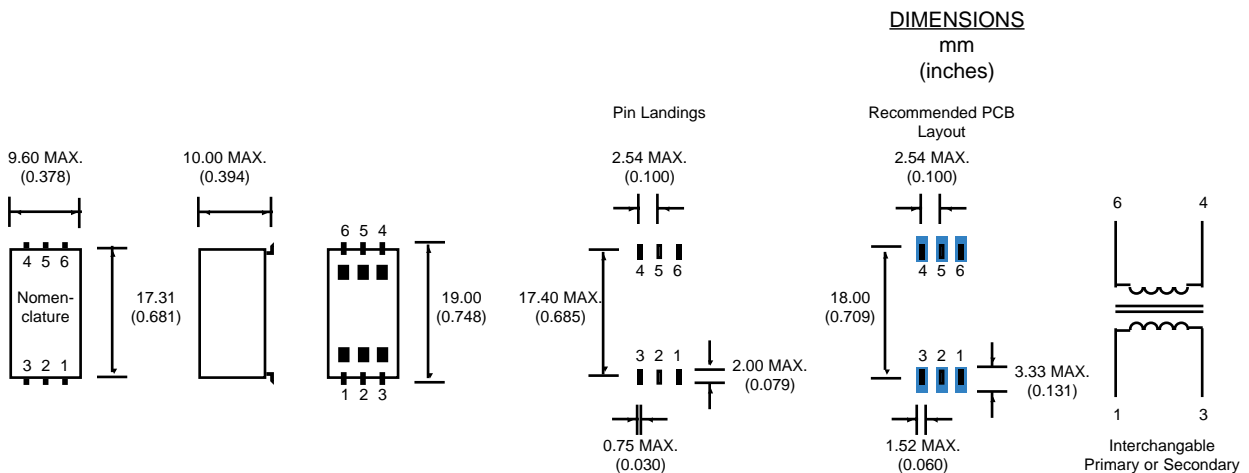
PRODUCT COMPLIANCE

- UL / C-UL recognized file number: Pending
- BSI certificate number(s): Pending
- BABT certificate of recognition: Pending

NOMENCLATURE (Fig. 1)



MECHANICAL DIMENSIONS (Fig. 2)



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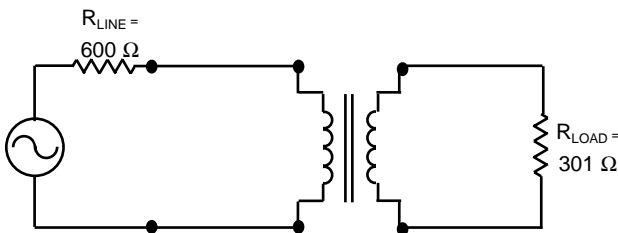
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ELECTRICAL PERFORMANCE SPECIFICATIONS

Electrical Performance Specifications ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise specified)

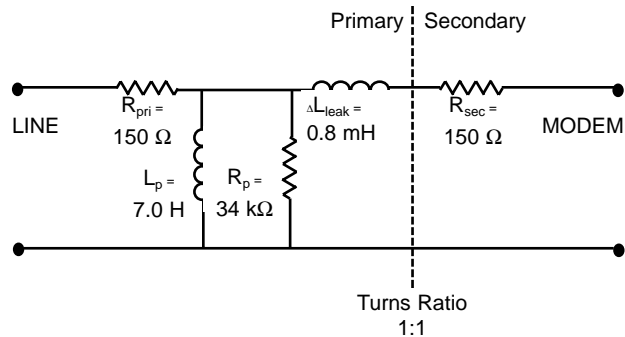
PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNITS
Impedance	Reflected on Primary With Load on Secondary	-	600	-	Ohms
		-	301	-	Ohms
Total Harmonic Distortion	@ 600 Hz, -10 dBm @ 150 Hz, -3 dBm	-	-92 or better	-??	dB
		-	-79 or better	-??	dB
Insertion Loss	Per IEEE method; @ 2000 Hz	-	2.60	3.50	dB
Return Loss	200 Hz - 4000 Hz Per 600 Ohm Match (Fig. 3) Per CTR21 Pan-Euro Match (Fig. 10)	28	-	-	dB
		26	-	-	dB
Dielectric Breakdown Isolation Production methods applied:	Safety Standard tested 1 Min.	3000	-	-	Vrms
	HiPot Voltage	3750	-	-	Vrms
	Duration	2	-	-	Sec
	Trip Leakage Current	-	-	200	$\mu\text{A}$
Frequency Response	200 Hz - 4000 Hz	-	$\pm 0.10$	-	dB
Longitudinal Balance	Per FCC part 68.310 60 Hz - 1000 Hz 1000 Hz - 4000 Hz	60	-	-	dB
		40	-	-	dB
DC Resistance @ $20^\circ\text{C}$ , $\pm 10\%$	Primary Winding Secondary Winding	-	150	-	Ohms
		-	150	-	Ohms
DC Current in Primary	-	-	0	-	mADC
Turns Ratio	Primary to Secondary; $\pm 2\%$	-	1:1	-	Turns
Operating Temperature	-	-40	-	105	$^\circ\text{C}$
Storage Temperature	-	-40	-	125	$^\circ\text{C}$
Soldering Temperature	10 Sec. Max.	-	-	260	$^\circ\text{C}$

600 OHM MATCH (Fig. 3)



SCHEMATIC EQUIVALENT (Fig. 4)

(Typical Transformer Model @ 1 V, 1 kHz)



SPICE model shows initial measurements of engineering sample. See page 5 note.

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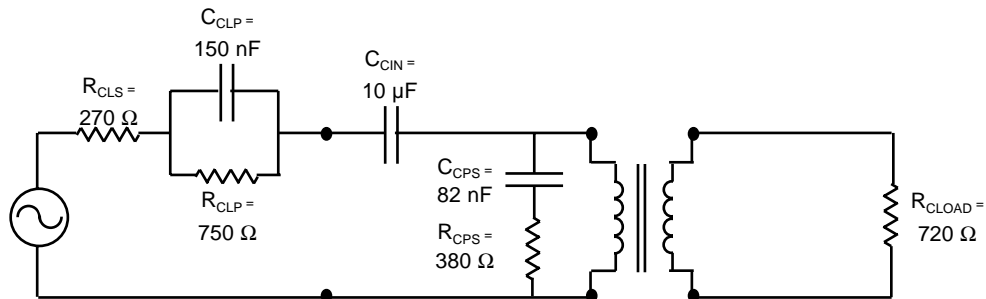
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## STANDARD PACKAGING (Fig. 9)

Standard packaging will be provided in tape-and-reel. Selection of the reel, and therefore user drawing, are pending.

## PAN-EUROPEAN CTR21 MATCH (Fig. 10)

(Application circuits available on request for specific national match requirements.)

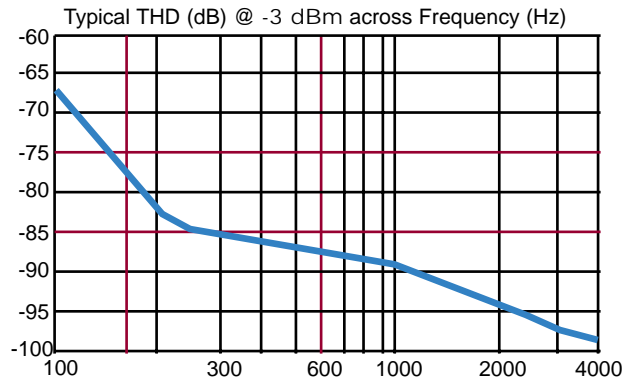
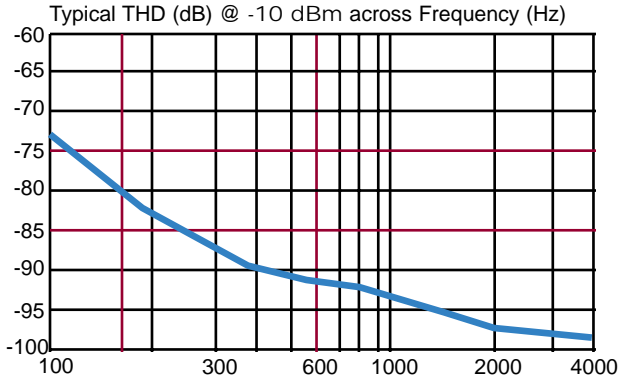


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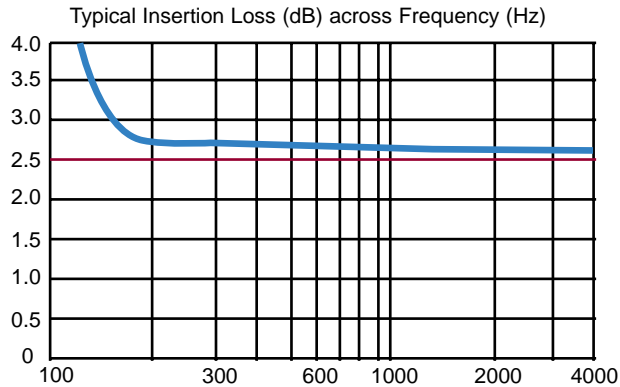
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PERFORMANCE DATA

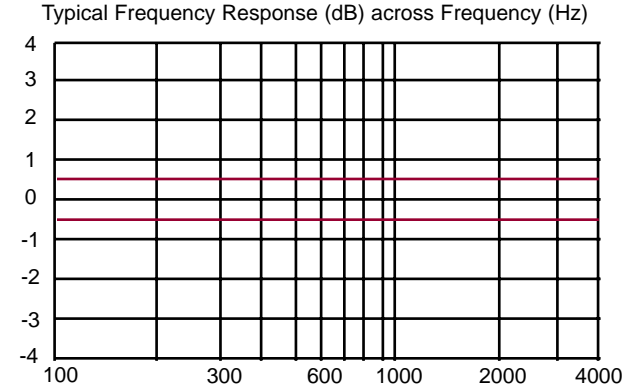
TOTAL HARMONIC DISTORTION (Fig. 5)



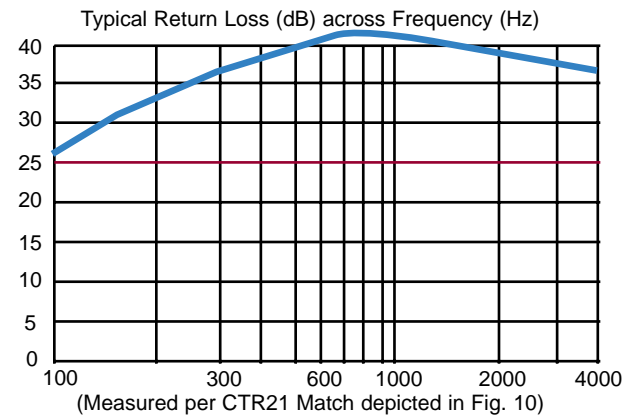
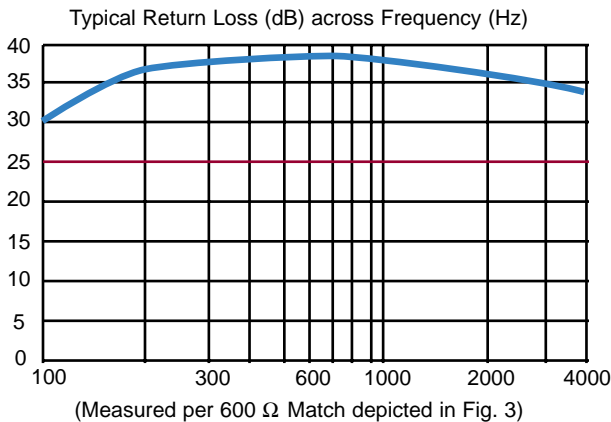
INSERTION LOSS (Fig. 6)



FREQUENCY RESPONSE (Fig. 7)



RETURN LOSS (Fig. 8)

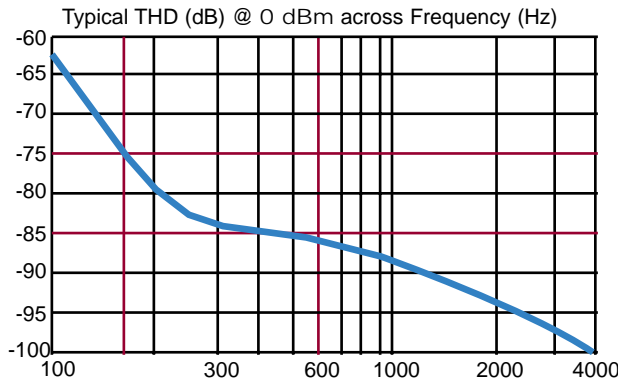


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ADDITIONAL DATA

TOTAL HARMONIC DISTORTION (Fig. 5)



Distortion rating is expected to improve as this devices moves into production by a few dB or more for the following two reasons:

1. Engineering samples made using stereolithography-based bobbins did not allow space for a final layer of core lamination due to the fact stereolithography does not maintain mechanical dimensions well.
2. All layers of core laminations in test devices were cut by laser. Laser edge burrs tend to create gaps between the laminations, which lessens inductance and distortion ratings.

The above two improvements in production material will increase both Distortion and Shunt Inductance ratings.

SCHEMATIC EQUIVALENT (Fig. 4)

Frequency (f in Hz)	Shunt Inductance ( $L_p$ in H)	Shunt Loss ( $R_p$ in $k\Omega$ )	Leakage Inductance ( $\Delta L_{leak}$ in mH)
100	17.803	15.423	4.62
150	14.562	18.719	3.32
200	13.090	20.627	1.96
250	12.701	21.828	1.55
300	11.756	23.228	1.31
350	10.999	24.416	1.17
400	10.469	25.500	1.07
450	9.958	26.444	1.01
500	9.497	27.310	0.96
550	9.142	28.144	0.92
600	8.801	28.904	0.89
650	8.490	29.614	0.87
700	8.204	30.278	0.85
750	7.939	30.906	0.83
800	7.736	31.576	0.82
850	7.527	32.175	0.80
900	7.332	32.755	0.79
<b>1000</b>	<b>6.973</b>	<b>33.830</b>	<b>0.78</b>
1500	5.798	38.624	0.74
2000	5.144	42.678	0.72
2500	4.741	46.188	0.71
3000	4.527	49.360	0.71
3500	4.447	52.290	0.70
4000	4.457	54.960	0.70

The table immediately left shows SPICE variables across a frequency sweep.

DC Resistances of coils,  $R_{pri}$  and  $R_{sec}$ , are 150 ohms  $\pm 10\%$ , and do not vary significantly with frequency.

After production samples are available, the SPICE parameters will be re-estimated across a larger quantity of devices. As a result of such further testing, the updated SPICE model will indicate the following statistics in order to deal with lot-to-lot variations in core lamination material::

1. Shunt Inductance ( $L_p$ ) will be indicated at two standard deviations **below** average of the samples because higher values are better.
2. Shunt Loss ( $R_p$ ) will be indicated at two standard deviations **below** average of the samples because higher values are better.
3. Leakage Inductance ( $\Delta L_{leak}$ ) will be indicated at two standard deviations **above** average of the samples because lower values are better.

At the time of this Preliminary Specification, an insufficient number of sample devices have been created in order to provide the above standard deviation statistics. The table immediately left shows the direct measurements of a representative engineering sample.