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Analog Telephony / Modem Couplers

PHOTO PENDING

DESCRIPTION

The REMtech Magnetics ESMIT-3576 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 and maximum 10 mm height for pick and place. A great solution for boards with limited footprint space.

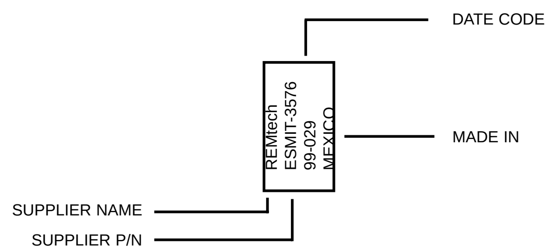
FEATURES

- 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 -80 dB typ. @ 150 Hz, -3 dBm.
- Insertion Loss rated 2.90 dB typ. @ 2000 Hz.
- Complies with IEC60950 Reinforced safety norms.
- Uses minimal external components for impedance matching to 600 Ohms telephone lines.
- 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

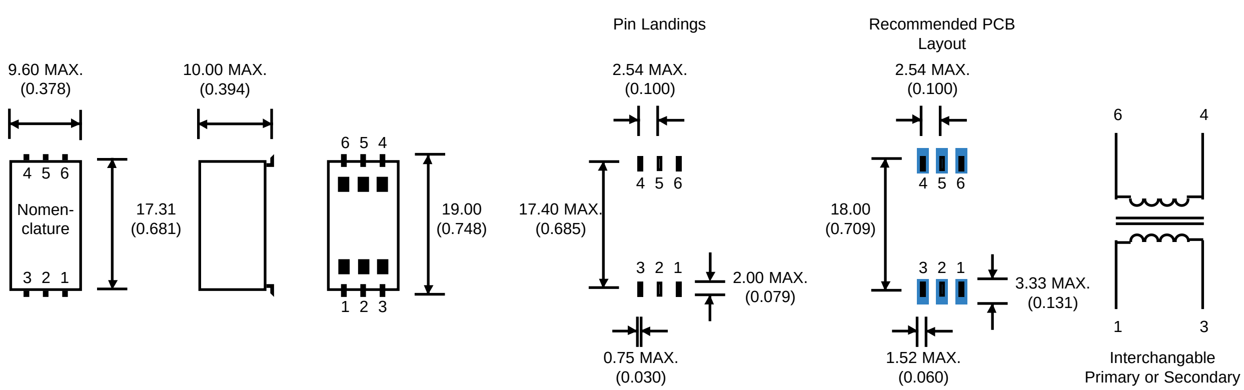
- UL / C-UL recognized file number: E171120
- BSI certificate number(s): Pending
- BABT certificate of recognition: Pending

NOMENCLATURE (Fig. 1)



MECHANICAL DIMENSIONS (Fig. 2)

DIMENSIONS
mm
(inches)



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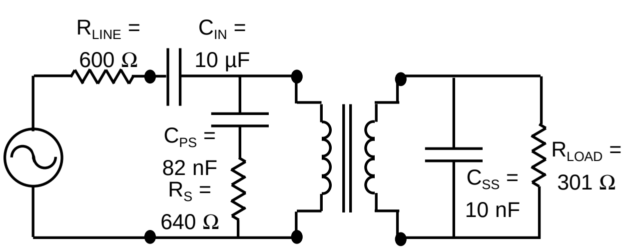
ELECTRICAL PERFORMANCE SPECIFICATIONS

Electrical Performance Specifications (T_A = 25 °C unless otherwise specified)

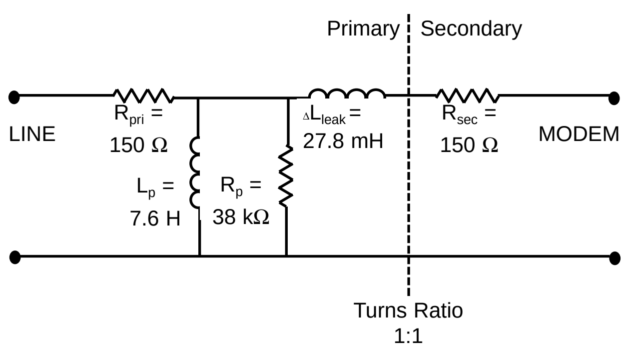
PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNITS
Impedance	Reflected on Primary With Load on Secondary	- -	600 301	- -	Ohms Ohms
Total Harmonic Distortion	@ 600 Hz, -10 dBm @ 150 Hz, -3 dBm	- -	-92 or better -80 or better	-?? -??	dB dB
Insertion Loss	Per IEEE method; @ 2000 Hz	-	2.90	3.50	dB
Return Loss	200 Hz - 4000 Hz Per 600 Ohm Match (Fig. 3) Per CTR21 Pan-Euro Match (Fig. 10)	 18 25	 - -	 - -	 dB dB
Dielectric Breakdown Isolation Production methods applied:	Safety Standard tested 1 Min. HiPot Voltage Duration Trip Leakage Current	3000 3750 2 -	- - - -	- - - 200	Vrms Vrms Sec µA
Frequency Response	200 Hz - 4000 Hz	-	±1.60	-	dB
Longitudinal Balance	Per FCC part 68.310 60 Hz - 1000 Hz 1000 Hz - 4000 Hz	 60 40	 - -	 - -	 dB dB
DC Resistance @ 20°C, ±10%	Primary Winding Secondary Winding	- -	150 150	- -	Ohms Ohms
DC Current in Primary	-	-	0	-	mADC
Turns Ratio	Primary to Secondary; ±2%	-	1:1	-	Turns
Operating Temperature	-	-40	-	105	°C
Storage Temperature	-	-40	-	125	°C
Soldering Temperature	10 Sec. Max.	-	-	260	°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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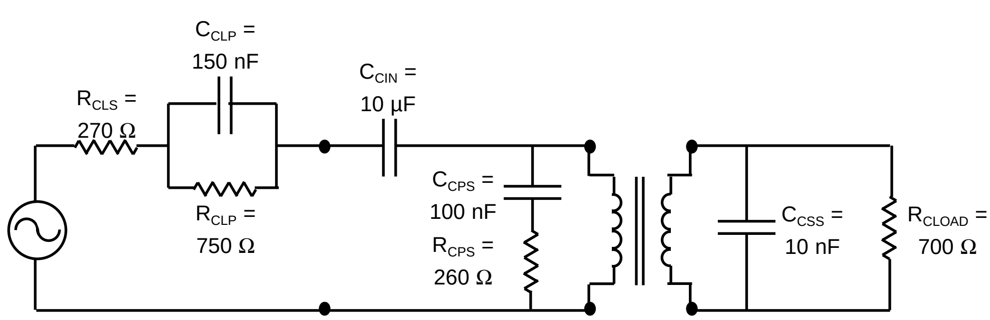
STANDARD PACKAGING (Fig. 9)

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

PAN-EUROPEAN CTR21 MATCH (Fig. 10)

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



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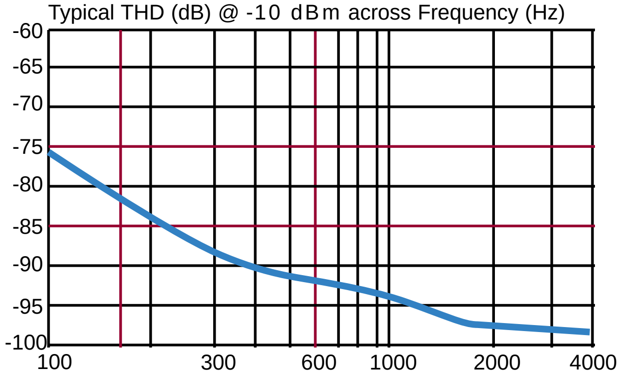
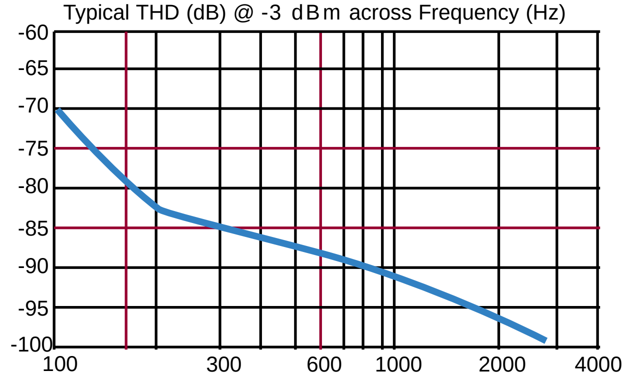
PERFORMANCE DATA

TOTAL HARMONIC DISTORTION (Fig. 5)

Typical THD (dB) @ -10 dBm across Frequency (Hz)

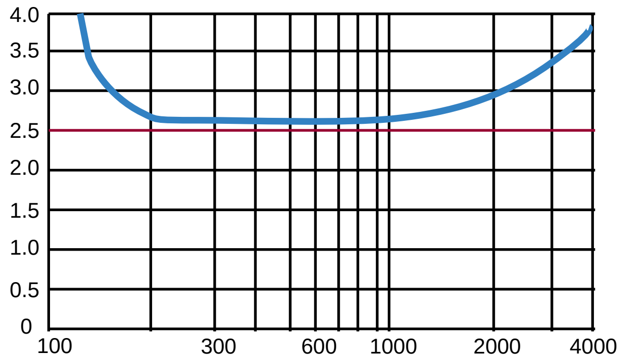


Typical THD (dB) @ -3 dBm across Frequency (Hz)



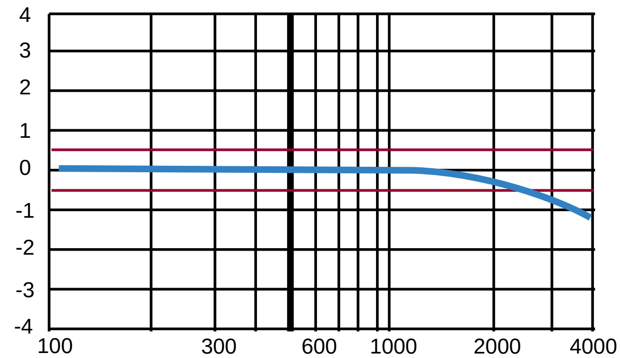
INSERTION LOSS (Fig. 6)

Typical Insertion Loss (dB) across Frequency (Hz)



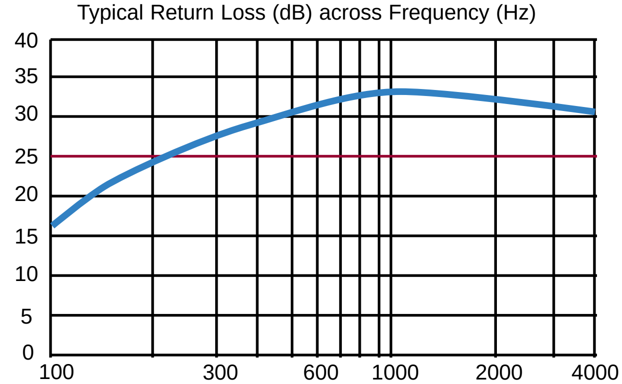
FREQUENCY RESPONSE (Fig. 7)

Typical Frequency Response (dB) across Frequency (Hz)

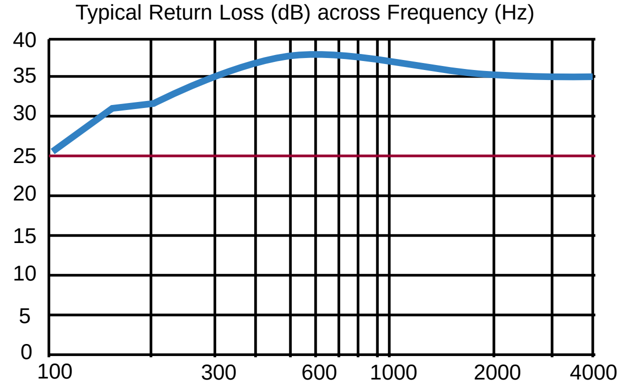


RETURN LOSS (Fig. 8)

Typical Return Loss (dB) across Frequency (Hz)



Typical Return Loss (dB) across Frequency (Hz)



(Measured per CTR21 Match depicted in Fig. 10)

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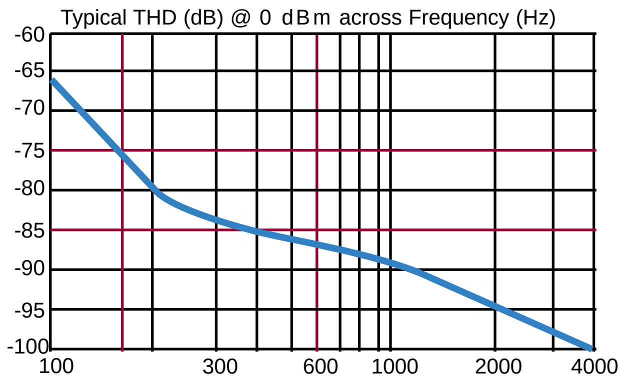
ADDITIONAL DATA

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 kΩ)	Leakage Inductance (ΔL_{leak} in mH)
100	18.973	18.025	30.98
150	16.914	20.889	29.58
200	15.284	23.026	28.72
250	14.042	24.958	28.40
300	13.052	26.472	28.21
350	12.272	27.774	28.10
400	11.602	28.950	28.02
450	11.038	29.998	27.97
500	10.539	30.974	27.93
550	10.097	31.876	27.90
600	9.704	32.730	27.87
650	9.351	33.535	27.85
700	9.028	34.305	27.84
750	8.735	35.038	27.82
800	8.459	35.750	27.81
850	8.211	36.434	27.80
900	7.982	37.090	27.79
1000	**7.569**	**38.362**	**27.78**
1500	6.145	43.894	27.74
2000	5.286	48.585	27.72
2500	4.735	52.605	27.70
3000	4.351	56.240	27.69
3500	4.069	59.540	27.68
4000	3.860	62.570	27.68

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

DC Resistances of coils, R_{pri} and R_{sec}, are 150 ohms ±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 (ΔL_{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.

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