



**PowerLine Telecommunications (PLT);
MIMO PLT;
Part 1: Universal Coupler,
Operating Instructions - Description**

[ETSI TR 101 562-1 V1.2.1 \(2011-08\)](https://standards.iteh.ai/catalog/standards/etsi/0b37b464-75bc-4617-90f0-323b88332699/etsi-tr-101-562-1-v1-2-1-2011-08)

<https://standards.iteh.ai/catalog/standards/etsi/0b37b464-75bc-4617-90f0-323b88332699/etsi-tr-101-562-1-v1-2-1-2011-08>

Reference

RTR/PLT-00034

Keywords

coupling, MIMO, powerline

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

(<https://standards.iteh.ai>)
Document Preview

Important notice

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

http://portal.etsi.org/chaicor/ETSI_support.asp

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2011.
All rights reserved.

DECTTM, PLUGTESTSTM, UMTSTM and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPPTM and LTETM are Trade Marks of ETSI registered for the benefit of its Members and
of the 3GPP Organizational Partners.
GSM[®] and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	4
Foreword.....	4
Introduction	4
1 Scope	5
2 References	5
2.1 Normative references	5
2.2 Informative references	5
3 Symbols and abbreviations.....	6
3.1 Symbols.....	6
3.2 Abbreviations	6
4 Major Project Phases	7
5 Motivation	7
6 MIMO PLT Universal Coupler	8
7 Safety note.....	9
8 Objectives of the MIMO PLT (STF 410) design	9
9 Technical Data of Couplers.....	10
9.1 Impedance conditions.....	10
9.2 Insertion Loss	11
10 Operation.....	11
10.1 SISO transmit and SISO receive (example P-N to P-N)	11
10.2 MIMO symmetric transmit (example N-E), MIMO receive star plus CM.....	12
10.3 MIMO asymmetric transmit (example N-E), MIMO receive star plus CM	12
10.4 SISO common mode transmit and SISO common mode receive	13
10.5 Alternative MIMO mode using dual wire feed.....	14
11 Circuit diagram.....	16
12 Measurement Results	18
12.1 SISO	18
12.2 MIMO symmetric.....	19
12.3 MIMO Delta transmit to star receive.....	20
12.4 Common mode Reception	22
12.5 Alternative MIMO modes (dual wire feed).....	23
Annex A: Bibliography	24
History	25

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Powerline Telecommunications (PLT).

The present document is part 1 of a multi-part deliverable covering the MIMO PLT as identified below:

- Part 1: "Universal Coupler, Operating Instructions - Description";**
- Part 2: "Measurement Methods and Statistical Results of MIMO PLT EMI";
- Part 3: "Measurement Methods and Statistical Results of MIMO PLT channels".

Introduction

In order to study and compare MIMO (Multiple Input Multiple Output) characteristics of the LVDN network in different countries the STF 410 (Special Task Force) was set up. The present document is one of three TRs which present the result of the work of STF 410. The work items in ETSI TC PLT dealing with the results of STF 410 are the present document, TR 101 562-2 [i.6] and TR 101 562-3 [i.7].

The present document specified the measurement tools, set-up and procedure to record parameters like MIMO channel transfer functions, impedances and noise. Statistical evaluations of the recorded data is given in clause 8.

A second document produced by STF 410 deals with the EMI of MIMO PLC. The third document presents the schematics and properties of the MIMO PLC couplers used for feeding and receiving signals into the mains grid. These couplers are used for the channel as well the EMI measurements.