

Introduction

Due to the use of baluns, the usual HF test equipment cannot ensure a reasonable accuracy for a frequency range over 3 decades. AESA introduces Cobalt, a new balunless automatic test equipment based on the modal decomposition mathematical algorithms. This method enables measuring a very broad frequency range as well as very short cables, but also opens the door to many additional parameters. Until now parameters like LCL had to be measured with a separate equipment. It was also simply not possible to measure automatically in-pair and individual wire parameters. This document lists the parameters provided by our Cobalt automatic test equipment.

1. Through-Measurements

Mixed mode Parameter / Reflection Differential Mode	
Abbreviation	Description
RLdd11, RLdd22	RLdd11 = Return loss near RLdd22 = Return loss far
Input impedance (near, far) dd	Input impedance near Input impedance far
S11dd, S22dd	S11dd = Reflection complex as Smith chart near S22dd = Reflection complex as Smith chart far
Input impedance fitted (near, far) dd	Fitted input impedance near Fitted input impedance near far
SRL (near, far) dd	Structural return loss near Structural return loss near far

Mixed mode Parameter / Transmission Differential Mode	
Abbreviation	Description
ILdd21, ILdd12	ILdd21 = Insertion loss forward ILdd12 = Insertion loss reverse
S21dd, S12dd	S21dd = Transmission complex as Smith chart forward S12dd = Transmission complex as Smith chart reverse
AttPhase (f, r)dd	Attenuation phase forward Attenuation phase reverse
Phase Delay (f, r)dd	Phase delay forward Phase delay reverse
Velocity (f, r)dd	Velocity calculated from phase delay forward Velocity calculated from phase delay reverse
Velocity% (f, r)dd	Velocity in % calculated from phase delay forward Velocity in % calculated from phase delay reverse
Skew (f, r)dd	Skew calculated from phase delay forward Skew calculated from phase delay reverse
Zc (f, r)dd	Characteristic Impedance calculated from phase delay forward Characteristic Impedance calculated from phase delay reverse
Group Delay (f, r)dd	Group delay forward Group delay reverse
Velocity (f, r)dd	Velocity calculated from group delay forward Velocity calculated from group delay reverse
Velocity% (f, r)dd	Velocity in % calculated from group delay forward Velocity in % calculated from group delay reverse
Skew (f, r)dd	Skew calculated from group delay forward Skew calculated from group delay reverse
Zc (f, r)dd	Characteristic Impedance calculated from group delay forward Characteristic Impedance calculated from group delay reverse

Mixed mode Parameter / Reflection Common Mode	
Abbreviation	Description
RLcc11, RLcc22	RLcc11 = Return loss near RLcc11 = Return loss far
Input impedance (near, far) cc	Input impedance near Input impedance far
S11cc, S22cc	S11cc = Reflection complex near as Smith Chart S22cc = Reflection complex far as Smith Chart
Input impedance fitted (near, far) cc	Fitted input impedance near Fitted input impedance far
SRL (near, far) cc	Structural return loss near Structural return loss far

Mixed mode Parameters / Transmission Common Mode	
Abbreviation	Description
ILcc21, ILcc12	ILcc21 = Insertion loss forward ILcc21 = Insertion loss reverse
S21cc, S12cc	S21cc = Transmission complex near as Smith chart S12cc = Transmission complex far as Smith chart
AttPhase (f, r)cc	Attenuation phase forward Attenuation phase reverse
Phase Delay (f, r)cc	Phase delay forward Phase delay reverse
Velocity (f, r)cc	Velocity calculated from phase delay forward Velocity calculated from phase delay reverse
Velocity% (f, r)cc	Velocity in % calculated from phase delay forward Velocity in % calculated from phase delay reverse
Skew (f, r)cc	Skew calculated from phase delay forward Skew calculated from phase delay reverse
Zc (f, r)cc	Characteristic Impedance calculated from phase delay forward Characteristic Impedance calculated from phase delay reverse
Group Delay (f, r)cc	Group delay forward Group delay forward reverse
Velocity (f, r)cc	Velocity calculated from group delay forward Velocity calculated from group delay forward reverse
Velocity% (f, r)cc	Velocity in % calculated from group delay forward Velocity in % calculated from group delay reverse
Skew (f, r)cc	Skew calculated from group delay forward Skew calculated from group delay reverse
Zc (f, r)cc	Characteristic impedance calculated from group delay forward Characteristic impedance calculated from group delay reverse

Mixed mode Parameters / Conversion Loss	
Abbreviation	Description
LCLdc11, LCLdc22	LCLdc11 = Longitudinal conversion loss forward LCLdc12 = Longitudinal conversion loss reverse
LCTLdc21, LCTLdc12	LCTLdc21 = Longitudinal conversion transfer loss forward LCTLdc12 = Longitudinal conversion transfer loss reverse
TCLcd11, TCLcd22	TCLcd11 = Transverse conversion loss forward TCLcd11 = Transverse conversion loss reverse
TCTLcd21, TCTLcd12	TCTLcd21 = Transverse conversion transfer loss forward TCTLcd12 = Transverse conversion transfer loss reverse
ELTCTLcd (f, r)	Equal level transverse conversion transfer loss forward Equal level transverse conversion transfer loss reverse

Single ended Parameters / Reflection	
Abbreviation	Description
S11, S33, S22, S44	S11 = Reflection complex of core 'a' near as Smith chart S33 = Reflection complex of core 'b' near as Smith chart S22 = Reflection complex of core 'a' far as Smith chart S44 = Reflection complex of core 'b' far as Smith chart
Input impedance a, b (near, far)	Input impedance of core 'a' near Input impedance of core 'a' far Input impedance of core 'b' near Input impedance of core 'b' far
Input impedance fitted a, b (near, far)	Fitted input impedance of core 'a' near Fitted input impedance of core 'a' far Fitted input impedance of core 'b' near Fitted input impedance of core 'b' far
SRL a/b (near, far)	Structural return loss of core 'a' near Structural return loss of core 'a' far Structural return loss of core 'b' near Structural return loss of core 'b' far
NEXT a, b/b, a (near, far)	Near end cross talk between core 'a' and 'b' forward Near end cross talk between core 'a' and 'b' reverse Near end cross talk between core 'b' and 'a' forward Near end cross talk between core 'b' and 'a' reverse

Single ended Parameters / Transmission	
Abbreviation	Description
S21, S43, S12, S34	S21 = Single core attenuation 'a' forward S43 = Single core attenuation 'a' reverse S12 = Single core attenuation 'b' forward S34 = Single core attenuation 'b' reverse
IL a, b (f, r)	Insertion loss of core 'a' forward Insertion loss of core 'a' reverse Insertion loss of core 'b' forward Insertion loss of core 'b' reverse
AttPhase a, b (f, r)	Attenuation phase of core 'a' forward Attenuation phase of core 'a' reverse Attenuation phase of core 'b' forward Attenuation phase of core 'b' reverse
Phase Delay a, b (f, r)	Phase delay of core 'a' forward Phase delay of core 'a' reverse Phase delay of core 'b' forward Phase delay of core 'b' reverse
Velo a, b (f, r)	Velocity of core 'a' calculated from phase delay forward Velocity of core 'a' calculated from phase delay reverse Velocity of core 'b' calculated from phase delay forward Velocity of core 'b' calculated from phase delay reverse
Velo% a, b (f, r)	Velocity in % of core 'a' calculated from phase delay forward Velocity in % of core 'a' calculated from phase delay reverse Velocity in % of core 'b' calculated from phase delay forward Velocity in % of core 'b' calculated from phase delay reverse
In pair Skew a, b (f, r)	In pair skew from phase delay forward In pair skew from phase delay reverse
Zc a, b (f, r)	Charact. impedance of core 'a' calculated from phase delay forward Charact. impedance of core 'a' calculated from phase delay reverse Charact. impedance of core 'b' calculated from phase delay forward Charact. impedance of core 'b' calculated from phase delay reverse

Group Delay a, b (f, r)	Group delay of core 'a' forward Group delay of core 'a' reverse Group delay of core 'b' forward Group delay of core 'b' reverse
Velo a, b (f, r)	Velocity of core 'a' calculated from group delay forward Velocity of core 'a' calculated from group delay reverse Velocity of core 'b' calculated from group delay forward Velocity of core 'b' calculated from group delay reverse
Velo% a, b (f, r)	Velocity in % of core 'a' calculated from group delay forward Velocity in % of core 'a' calculated from group delay reverse Velocity in % of core 'b' calculated from group delay forward Velocity in % of core 'b' calculated from group delay reverse
In pair Skew a, b (f, r)	In pair skew from group delay forward In pair skew from group delay reverse
Zc a, b (f, r)	Charact. impedance of core 'a' calculated from group delay forward Charact. impedance of core 'a' calculated from group delay reverse Charact. impedance of core 'b' calculated from group delay forward Charact. impedance of core 'b' calculated from group delay reverse
FEXT a, b/b, a (near, far)	Far end cross talk between cores 'ab' forward Far end cross talk between cores 'ab' reverse Far end cross talk between cores 'ba' forward Far end cross talk between cores 'ba' reverse

2. NEXT-Measurements (can be measured from near and/or far end)

Mixed Mode Parameters differential mode	
Abbreviation	Description
NEXTdd (f, r)	Near end crosstalk forward Near end crosstalk reverse
PSNEXTdd (f, r)	Powersum near end crosstalk forward Powersum near end crosstalk reverse
ACR-Ndd (f, r)	Attenuation crosstalk ratio near end forward Attenuation crosstalk ratio near end reverse
PSACR-Ndd (f, r)	Powersum attenuation crosstalk ratio near end forward Powersum attenuation crosstalk ratio near end reverse
Mixed Mode Parameters common differential mode	
Abbreviation	Description
NEXTcd (f, r)	Near end crosstalk forward Near end crosstalk reverse
Mixed Mode Parameters differential common mode	
Abbreviation	Description
NEXTdc (f, r)	Near end crosstalk forward Near end crosstalk reverse
Mixed Mode Parameters common mode	
Abbreviation	Description
NEXTcc (f, r)	Near end crosstalk forward Near end crosstalk reverse

3. FEXT-Measurements

Mixed Mode Parameters differential mode	
Abbreviation	Description
FEXTdd (f, r)	Far end crosstalk forward Far end crosstalk reverse
PSFEXTdd (f, r)	Powersum far end crosstalk forward Powersum far end crosstalk reverse
ELFEXTdd (f, r)	Equal level far end crosstalk forward Equal level far end crosstalk reverse
PSELFEXTdd (f, r)	Powersum equal level far end crosstalk forward Powersum equal level far end crosstalk reverse
PSACR-Fdd (f, r)	Powersum attenuation crosstalk ratio far end forward Powersum attenuation crosstalk ratio far end reverse
Mixed Mode Parameters common differential mode	
Abbreviation	Description
FEXTcd (f, r)	Far end crosstalk forward Far end crosstalk reverse
Mixed Mode Parameters differential common mode	
Abbreviation	Description
FEXTdc (f, r)	Far end crosstalk forward Far end crosstalk reverse
Mixed Mode Parameters common mode	
Abbreviation	Description
FEXTcc (f, r)	Far end crosstalk forward Far end crosstalk reverse

Disclaimer

This document is a preliminary version and can still change. It has been compiled with greatest care. Nevertheless we cannot exclude the possibility of erroneous information or any misinterpretation of given information. Therefore application of the information presented in this document is at your own risk. AESA Cortailod appreciates any feedback on erroneous or unclear information in this document.

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