

Cliente : Rádio TV do Amazonas Ltda.					EQP : EC704MP		Alim.: 180 - 240Vac	
OV: HKLSO005823	OP: PD-083584	N.S : EAHP0041				CH : 16	Data: 25/05/2018	
Potência Nominal	300 Wrms	NA	Tuner Satélite	OK	Tuner CAS	NA	Tuner Terrestre OK ou NA (Não Aplicável)	
Análise Espectral (MS8901A ANRITSU)								
Setup	Frequência	Norma Anatel 498	Valor medido		Unidade	Figura	Observações	
Power Meter	Canal	± 2 %	300		Wrms	-	-	
Frequência	Canal	± 1 Hz	485.142.856,76		Hz	348	Sem modulação	
SET - 01	Largura de faixa	5,7 MHz@ 3dB	5.54	5.62	MHz	349/350	-	
SET - 02	FC -2.79 MHZ	≤ 0	-18,94		dB	351	-	
	FC +2.79 MHZ	≤ 0	-0,36		dB		-	
	FC -2.86MHZ	≤-20 dB	-45,40		dB		-	
	FC +2.86MHZ	≤-20 dB	-46,99		dB		-	
SET - 03	FC -3.0MHZ	≤-34 dB	-50,50		dB	352	-	
	FC +3.0MHZ	≤-34 dB	-58,76		dB		-	
	FC -3.15MHZ	≤-50 dB	-61,78		dB		-	
	FC +3.15MHZ	≤-50 dB	-63,66		dB		-	
SET - 04	Medidas antes do filtro		Valor medido + Atenuação filtro		-	-	-	
	FC -4.5MHZ	≤-67 dB	-49,81	-90,76	dB	353	Aten. Filtro	-40,95 dB
	FC +4.5MHZ	≤-67 dB	-46,46	-91,97	dB		Aten. Filtro	-45,51 dB
	FC -9.0MHZ	≤-97 dB	-50,64	-113,64	dB		Aten. Filtro	-63,00 dB
	FC +9.0MHZ	≤-97 dB	-50,01	-113,80	dB		Aten. Filtro	-63,79 dB
	FC -15MHZ	≤-97 dB	-56,95	-135,94	dB		Aten. Filtro	-78,99 dB
	FC +15MHZ	≤-97 dB	-58,40	-129,77	dB		Aten. Filtro	-71,37 dB
SET - 05	FC = referência	REF.	-22,68		dBm	354	-	
	2º Harmônico	≤- 60 dB	-89,13	-66,45	dBm / dB	355	-	
	3º Harmônico	≤- 60 dB	-87,23	-64,55	dBm / dB	356	-	
	Outros Espúrios	≤- 60 dB	-63,28		dB	357	-	
	Outros Espúrios	≤- 60 dB	-64,08		dB	358	-	
Análise da Modulação Digital (MS8901A Anritsu)								
Setup	Medida	Norma Anatel 498	Valor medido	Unidade	MER (Especificada pelo Cliente)	Figura	Observações	
ISDB-T V4.6 MER	MER Conv.	≥ 30 dB	41,41	dB	40 dB	359	Para transmissores de Alta Eficiência: MER de 35dB,38dB e 40dB,conforme Ordem de Venda	
	Constelação	≥ 30 dB	41,49	dB	-	360		
	Sub MER	≥ 30 dB	41,20	dB	-	361		
	Resp Freq	-	-	-	-	362		
ISDB - T V4.4	BER PN23	0	0.00E-10	-	-	363	-	
	BER AIR	0	0.00E-10	-	-	364	-	
Medida de Eficiência								
Valor Medido		Especificação (Ver planilha de cálculo)			Observações			
21,12	%	18,9 (Pot.Padrão de 240W)	%	-4%	Somente para transmissores de Alta Eficiência			
Ajuste de Polarização do Transistor								
LDMOS Drain Voltage		Carrier Amp.Current		Peak Amp. Gate Voltage		Observações		
50,0	Vdc	1,40	A	0,80	Vdc	Somente para transmissores de Alta Eficiência		
Software								
Controle : IS5A0007v1.44		FPGA : IS2S0004v1.20F				Potência : PAM40002v1.03		
Remote Control: ----		Combinadora: ----				CAM: CA2C0001v2.01		
Ethernet Digi: ISDG0008v1.08		Container: ----				CIP: 8753E	CIM: 3930G	
Trocador de Calor:	Modelo : ----				N.S : ----			

S/N diversos (switchers, conversores, telemetria, etc). *		
-	-	-
-	-	-
-	-	-

*Se necessário, acrescentar mais linhas.

Setup do Espectro							
	SET - 01	SET- 02	SET - 03	SET - 04	SET - 05	OBS:* Setup de referência para nível de +10dBm. Pode ser otimizado para melhor resolução da medida.	
Freq.	CENTRAL	CENTRAL	CENTRAL	FC - ESPÚRIO	FC*H		
SPAN	20 MHz	7 MHz	10 MHz	30 MHz	20 MHz		
BW	10 KHz	10 KHz	10 KHz	10 KHz	30 KHz		
VBW	100 Hz	100 Hz	100 Hz	100 Hz	300 KHz		
Average	8	8	8	8	30		
Sistem	1001	1001	1001	1001	1001	Atenuação da sonda:	-49,98 dB
Amplitude *	1 dBm	1 dBm	1 dBm	1 dBm	dBm/Det.Sample REF/2H/3H	Nível da amostragem:	+4,79 dBm
Atenuador *	20 dB	20 dB	20 dB	20 dB	dB	Disjuntor:	20A

Executante: Elton Acácio

Responsável Técnico: Mário Rotondaro	Ass: 
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Medidas do Anritsu

MS8901A EC704MP C16 EAHPO041
<< Frequency Counter (ISDB-T MER) >>

Storage : Average(10/ 10)

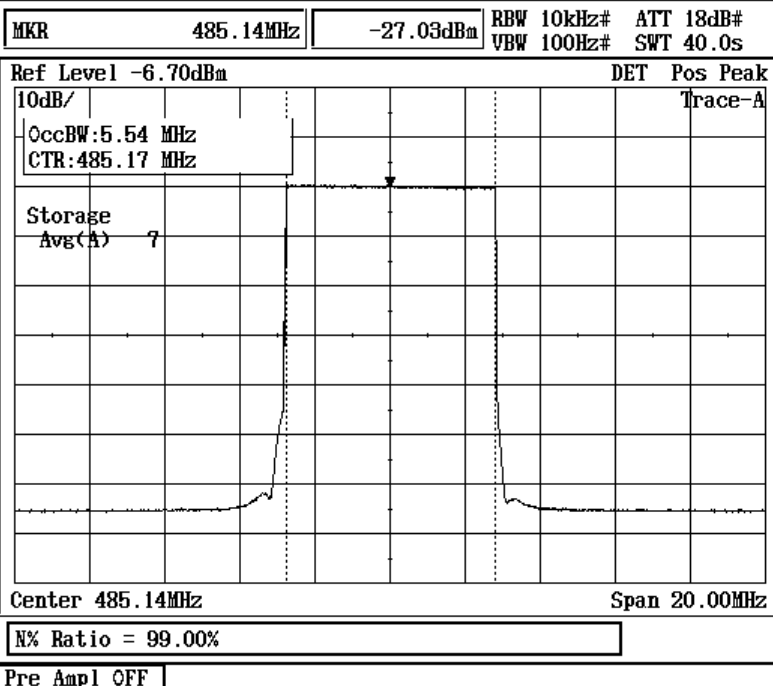
Frequency : 485.142 856 76 MHz
Frequency Error : -0.38 Hz
-0.0008 ppmFrequency
Counter*
Storage
ModeAdjust
RangeBack
Screen

1

Frequency : 485.142 857MHz Channel : 16CH
Ref Level : -4dBm Pre Ampl : Off

FIGURA 348

MS8901A EC704MP C16 EAHPO041

Measure
Occ BWOccupied
Bandwidth
On OffMethod
N% of Pwr
x dB DownN% Ratio
99.00%x dB Value
3.00dB

return

FIGURA 349



MS8901A EC704MP C16 EAHPO041

MKR 485.14MHz -27.03dBm RBW 10kHz# ATT 18dB#
VBW 100Hz# SWT 40.0s

Ref Level -6.70dBm DET Pos Peak

10dB/ Trace-A

OccBW:5.62 MHz

CTR:485.17 MHz

Storage

Avg(A) 7

Center 485.14MHz

Span 20.00MHz

x dB Value = 3.00dB

Pre Ampl OFF

Measure
Occ BWOccupied
Bandwidth

On Off

Method
N% of Pwr
x dB DownN% Ratio
99.00%x dB Value
3.00dB

return

FIGURA 350

MS8901A EC704MP C16 EAHPO041

MKR 485.143MHz -27.07dBm RBW 10kHz# ATT 18dB#
VBW 100Hz# SWT 14.0s

Ref Level -6.70dBm DET Pos Peak

20dB/ Trace-A

Storage

Avg(A) 4

Center 485.143MHz

Span 7.000MHz

Marker List

No.	Frequency	Level
* 1:	485.143 MHz	-27.07 dBm
2:R	-2.793 MHz	-18.94 dB
3:R	2.793 MHz	-0.36 dB
4:R	-2.863 MHz	-45.40 dB
5:R	2.863 MHz	-46.99 dB
6:		
7:		
8:		
9:		
10:		

Avg Count = 8

Pre Ampl OFF

Storage
AverageAveraging
Count
8Avg Mode
Stop
Non-Stop

Stop

Continue

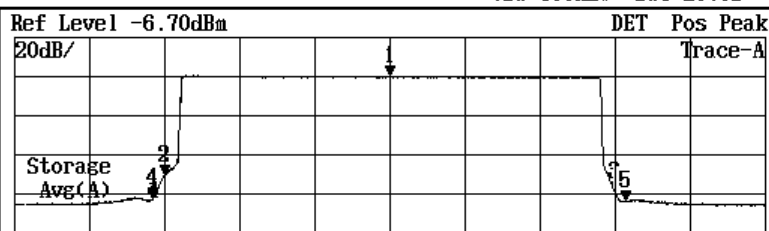
Restart

return

FIGURA 351



MS8901A EC704MP C16 EAHPO041

MKR 485.14MHz -26.64dBm RBW 10kHz# ATT 18dB#
VBW 100Hz# SWT 20.0s

Marker List

No.	Frequency	Level
* 1:	485.14 MHz	-26.64 dBm
2:R	-3.00 MHz	-50.50 dB
3:R	3.00 MHz	-58.76 dB
4:R	-3.15 MHz	-61.78 dB
5:R	3.15 MHz	-63.66 dB
6:		
7:		
8:		
9:		
10:		

Avg Count = 8

Pre Ampl OFF

Storage
AverageAveraging
Count
8Avg Mode
Stop
Non-Stop

Stop

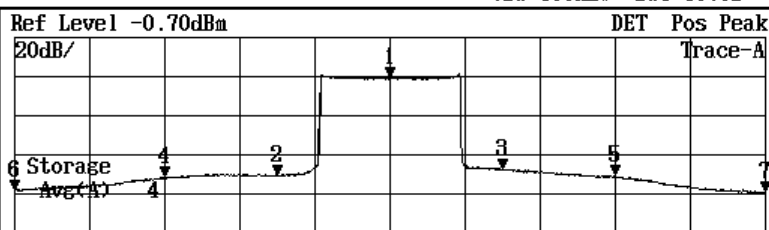
Continue

Restart

return

FIGURA 352

MS8901A EC704MP C16 EAHPO041

MKR 485.14MHz -21.68dBm RBW 10kHz# ATT 18dB#
VBW 100Hz# SWT 60.0s

Marker List

No.	Frequency	Level
* 1:	485.14 MHz	-21.68 dBm
2:R	-4.50 MHz	-49.81 dB
3:R	4.50 MHz	-46.46 dB
4:R	-9.00 MHz	-50.64 dB
5:R	9.00 MHz	-50.01 dB
6:R	-15.00 MHz	-56.95 dB
7:R	15.00 MHz	-58.40 dB
8:		
9:		
10:		

Ref Level = -0.70dBm

Pre Ampl OFF

Amplitude

Reference
Level*
Ref Level
Offset*
Correction*
Unit*
Log
Scale*
Linear
Scale

1 2

FIGURA 353

Laudo de Medidas de Transmissor Digital
ISDB-TB _Máscara Crítica

MS8901A EC704MP C16 EAHPO041

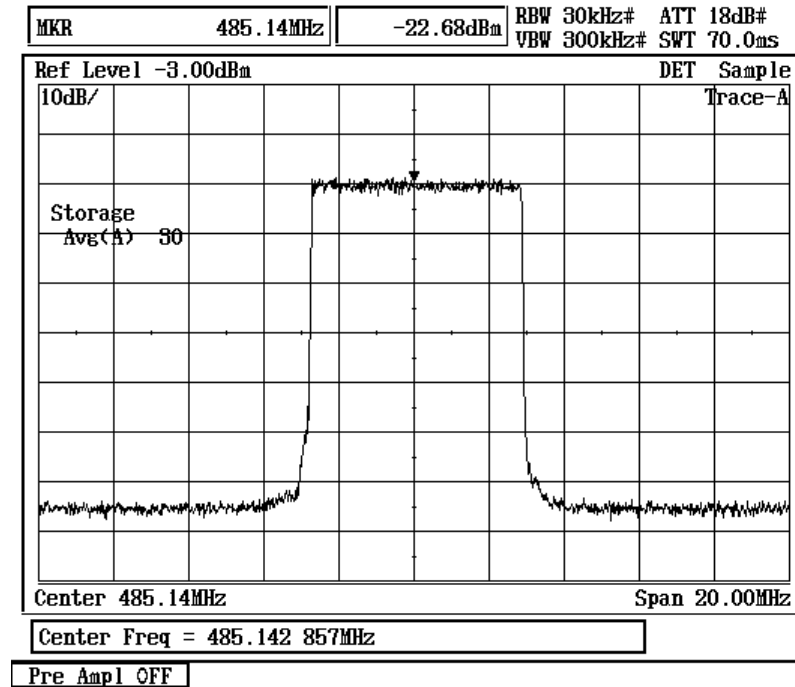


FIGURA 354

MS8901A EC704MP C16 EAHPO041

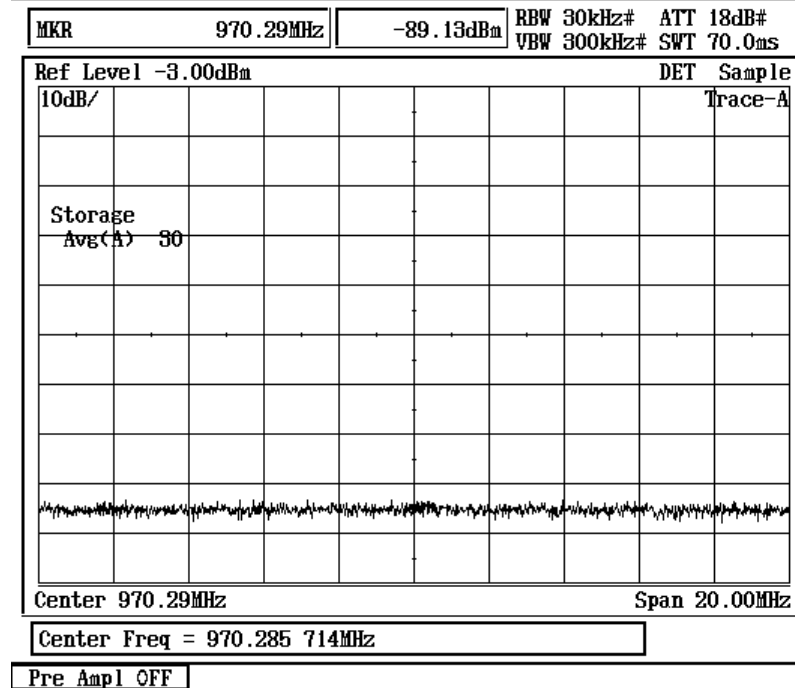
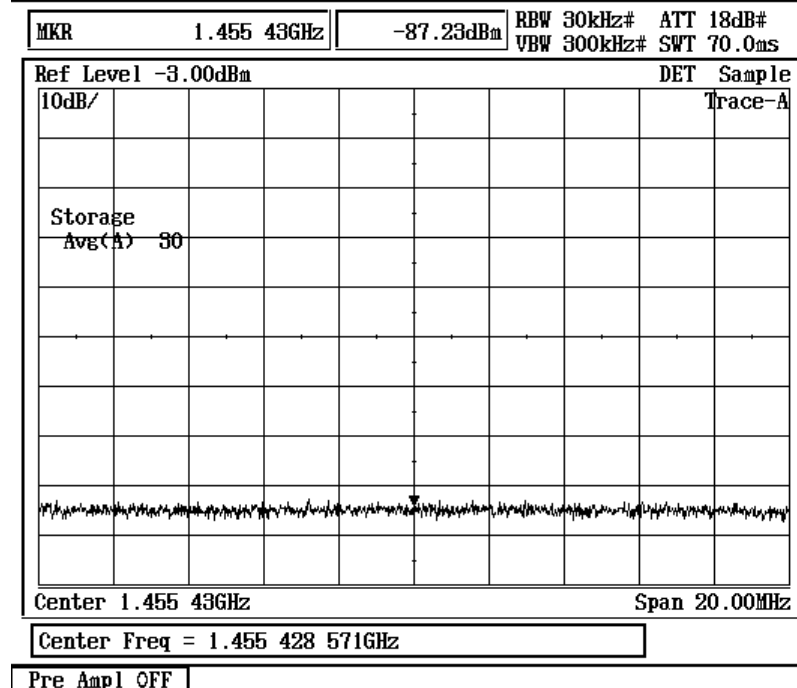


FIGURA 355



MS8901A EC704MP C16 EAHPO041



Frequency

Center
FreqStart
FreqStop
Freq

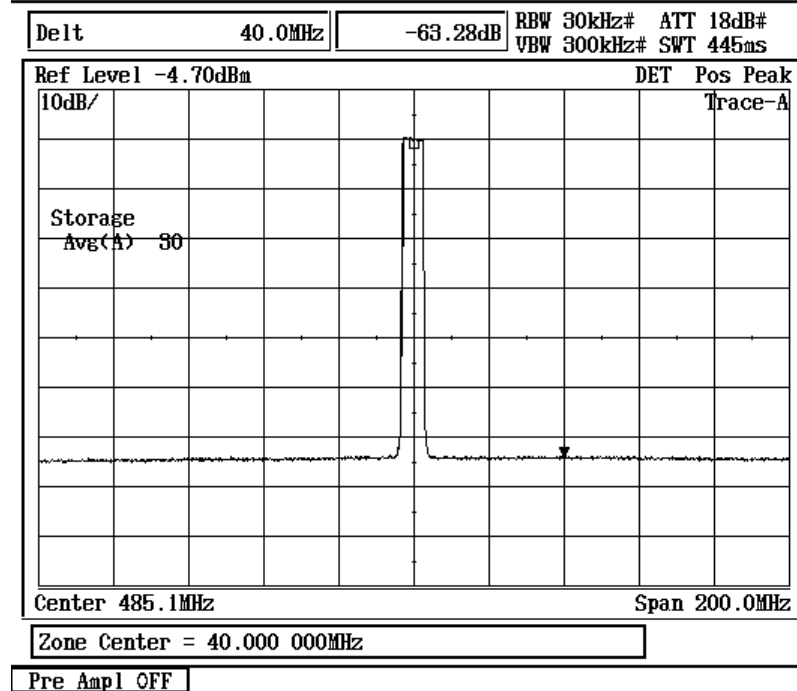
Auto Tune

CF
Step Size

1 2

FIGURA 356

MS8901A EC704MP C16 EAHPO041



Marker

Normal
MarkerDelta
MarkerMarker
OffMarker
Peak Dip*
Zone Width*
Marker ->

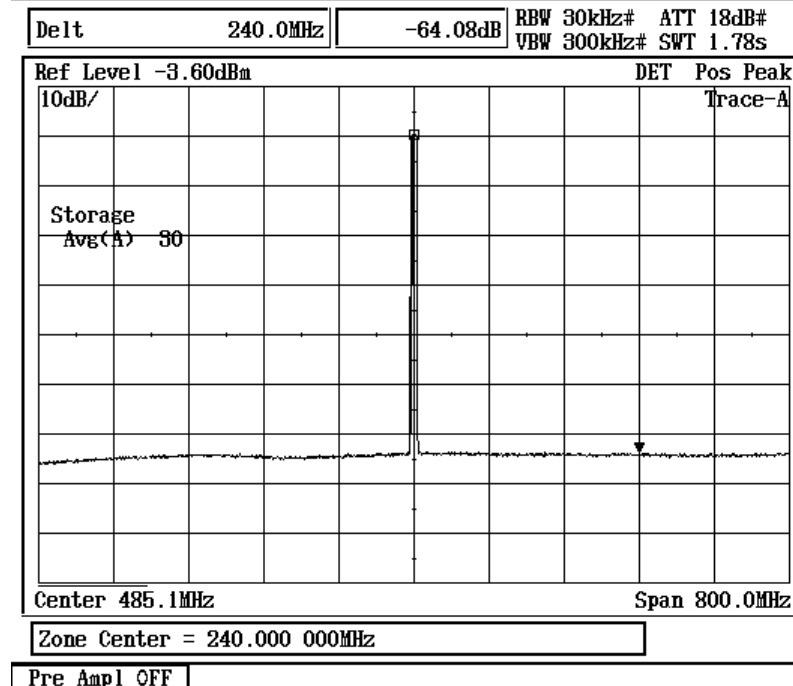
1 2

FIGURA 357



Laudo de Medidas de Transmissor Digital ISDB-TB _Máscara Crítica

MS8901A EC704MP C16 EAHPO041



Marker

Normal
MarkerDelta
MarkerMarker
OffMarker
Peak Dip*
Zone Width*
Marker ->

1 2

FIGURA 358

MS8901A EC704MP C16 EAHPO041

<< Modulation Analysis (ISDB-T MER) >> Measure : Continuous
Storage : Mov Avg(10/ 10)
Seg Ofs : 256
Equalizer: Standard

Frequency
Carrier Frequency : 485.142 856 76 MHz
Frequency Error : -0.38 Hz
-0.0008 ppm

MER
Conventional : 41.41 dB

		Seg	Mod
Layer_A	: 40.69 dB	13	64QAM
Layer_B	: ---- dB	0	64QAM
Layer_C	: ---- dB	0	64QAM

TMCC : 42.76 dB

AC1 : 42.83 dB
AC2 : ---- dB

Signal
Mode : Mode3
Guard Interval : 1/16

Frequency : 485.142 857MHz Channel : 16CH
Ref Level : 2dBm Pre Ampl : Off

Modulation
Analysis#
Trace
Format*
Storage
ModeAdjust
Range->
Back
Screen

1 2 3

FIGURA 359



Laudo de Medidas de Transmissor Digital ISDB-TB _Máscara Crítica

MS8901A EC704MP C16 EAHP0041

<< Modulation Analysis (ISDB-T MER) >>

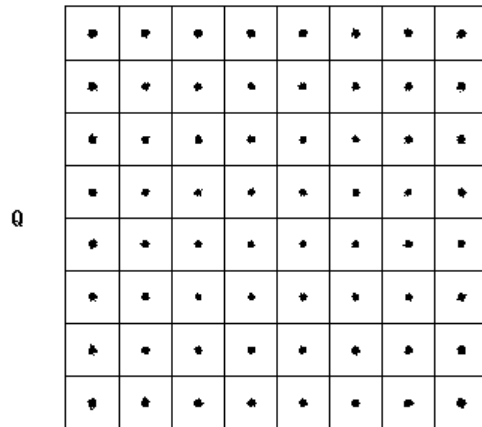
Measure : Continuous

Storage : Mov Avg(10/ 10)

Seg Ofs : 256

Equalizer: Standard

[Layer_A]



I

Carrier Frequency:
485.142 856 76 MHzFrequency Error:
-0.38 Hz
-0.0008 ppmMER(Conventional):
41.49 dBMER(Layer_A)
40.77 dBMarker: 9985 symbol
(I) 6.9867
(Q) -7.0262Frequency : 485.142 857MHz Channel : 16CH
Ref Level : 2dBm Pre Ampl : OffModulation
Analysis

#

Trace
Format

*

Storage
Mode

#

Section

Adjust
Range

→

Back
Screen

1 2 3

FIGURA 360

MS8901A EC704MP C16 EAHP0041

<< Modulation Analysis (ISDB-T MER) >>

Measure : Continuous

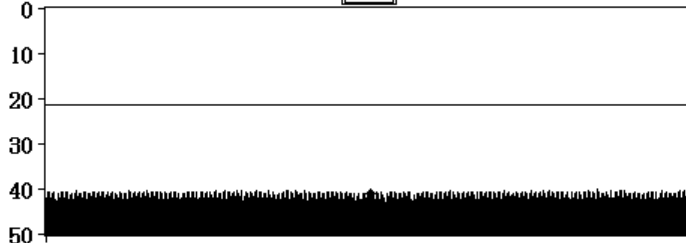
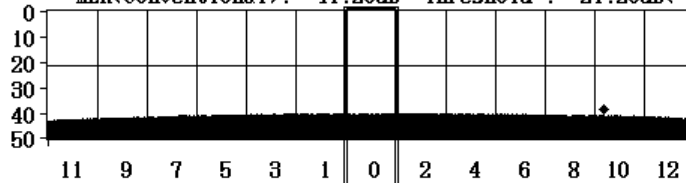
Storage : Mov Avg(10/ 10)

Seg Ofs : 256

Equalizer: Standard

MER[dB]

MER(Conventional): 41.20dB Threshold : 21.20dB(-20.00)

Start 484.929 MHz Stop 485.356 MHz
Marker Trace : Current Marker: 485.143 MHz 40.67 dB
Peak : 487.143 MHz 38.50 dBFrequency : 485.142 857MHz Channel : 16CH
Ref Level : 2dBm Pre Ampl : OffModulation
Analysis

#

Trace
Format

*

Storage
Mode

#

Threshold
OffsetAdjust
Range

→

Back
Screen

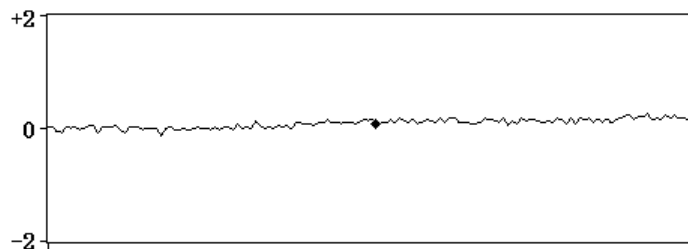
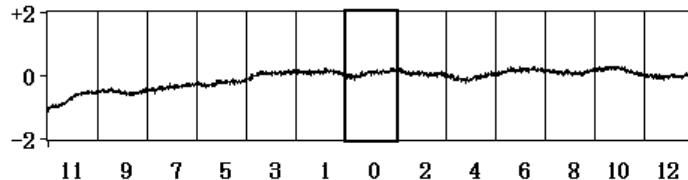
1 2 3

FIGURA 361

MS8901A EC704MP C16 EAHP0041

<< Modulation Analysis (ISDB-T MER) >> Measure : Continuous
Storage : Mov Avg(10/ 10)
Seg Ofs : 256
Equalizer: Standard

Ampl[dB]



Start 484.929 MHz

Stop 485.356 MHz

Marker: 485.145 MHz 0.08 dB

Frequency : 485.142 857MHz Channel : 16CH
Ref Level : 2dBm Pre Ampl : Off

Modulation
Analysis

#

Trace
Format

*

Storage
Mode

*

Correction

Adjust
Range

→

Back
Screen

1 2 3

FIGURA 362

MS8901A EC704MP C16 EAHP0041

<< BER + TMCC (ISDB-T) >> Measure : Continuous

BER PN

Mode:Mode3 GI:1/16 Elapsed Time:00:00:52
■Symbol ■Frequency ■Frame ■TMCC Error ■PN Sync

	Layer_A	Layer_B	Layer_C
Error Rate (RS):	0.00E-10	-----	-----
(01:00:10):	00:00:46	-----	-----
(01:00:10):	00:00:46	-----	-----

TMCC:

Current

	Layer_A	Layer_B	Layer_C
Modulation:	64QAM	-----	-----
Code Rate:	7/8	-----	-----
Interleave:	2	-----	-----
Segment:	13	-----	-----

Next

	Layer_A	Layer_B	Layer_C
Modulation:	-----	-----	-----
Code Rate:	-----	-----	-----
Interleave:	-----	-----	-----
Segment:	-----	-----	-----

System Descriptor: ISDB-T

Frequency : 485.142 857MHz Channel : 16CH Viterbi : On
Correction : Off Ref Level : 2dBm RS : On
ANT Factor : Off Impedance : 50Ω Pre Ampl : Off

BER

*

BER
Measuring
Time

*

BER
Mode
PN Air

#

BER
PN Type
PN23

*

BER
Output
Interface

*

BER
Auto Sync.
On Off

*

BER
ER Threshold

1 2 3

FIGURA 363



MS8901A EC704MP C16 EAHPO041

<< BER + TMCC (ISDB-T) >>

Measure : Continuous

BER Air

Mode:Mode3 GI:1/16 Elapsed Time:00:00:59

■Symbol ■Frequency ■Frame ■TMCC Error

	Layer_A	Layer_B	Layer_C
Error Rate	0.00E-10	-----	-----
(Viterbi):	1400897536	-----	-----
(1E+10):	(10003415040)	-----	-----
(Demod):	0.00E-10	-----	-----

TMCC:

Current

Modulation: 64QAM

Code Rate: 7/8

Interleave: 2

Segment: 13

Next

Modulation: -----

Code Rate: -----

Interleave: -----

Segment: -----

System Descriptor: ISDB-T

Frequency : 485.142 857MHz

Correction : Off

ANT Factor : Off

Channel : 16CH

Ref Level : 2dBm

Impedance : 50Ω

Viterbi : On

RS : On

Pre Ampl : Off

BER

#

BER
Measuring
Bits

BER

Mode

PN Air

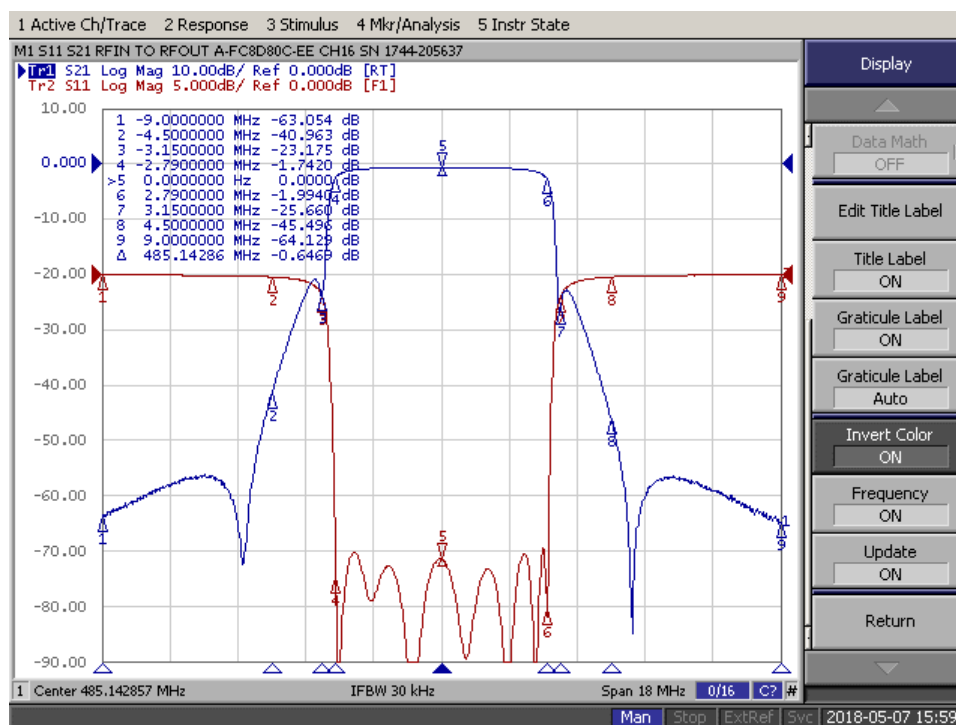
*

BER
ER Threshold

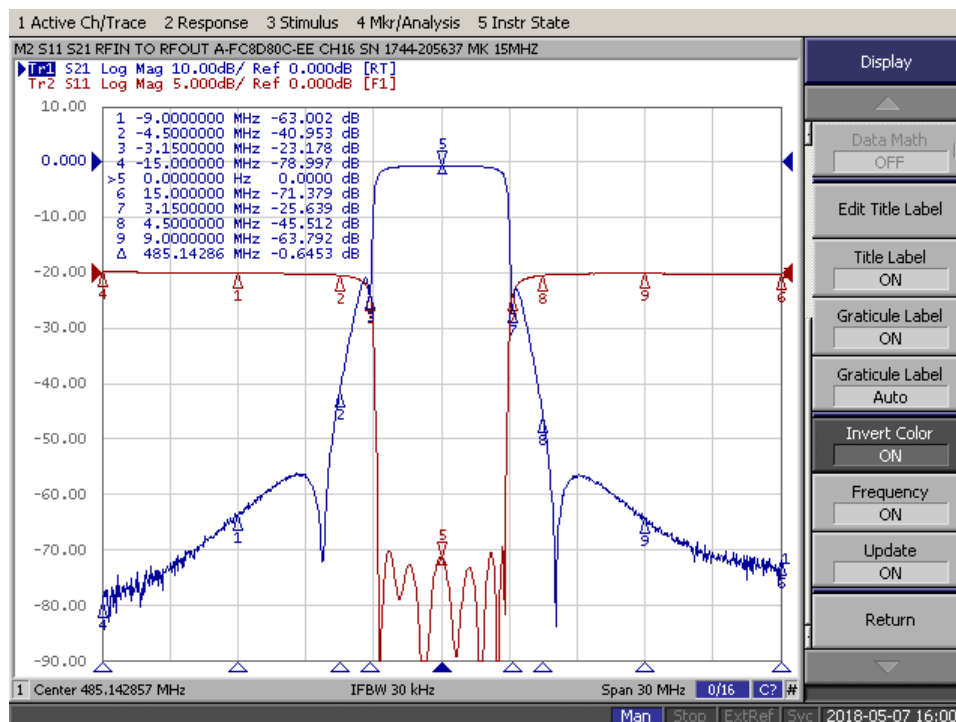
1 2 3

FIGURA 364

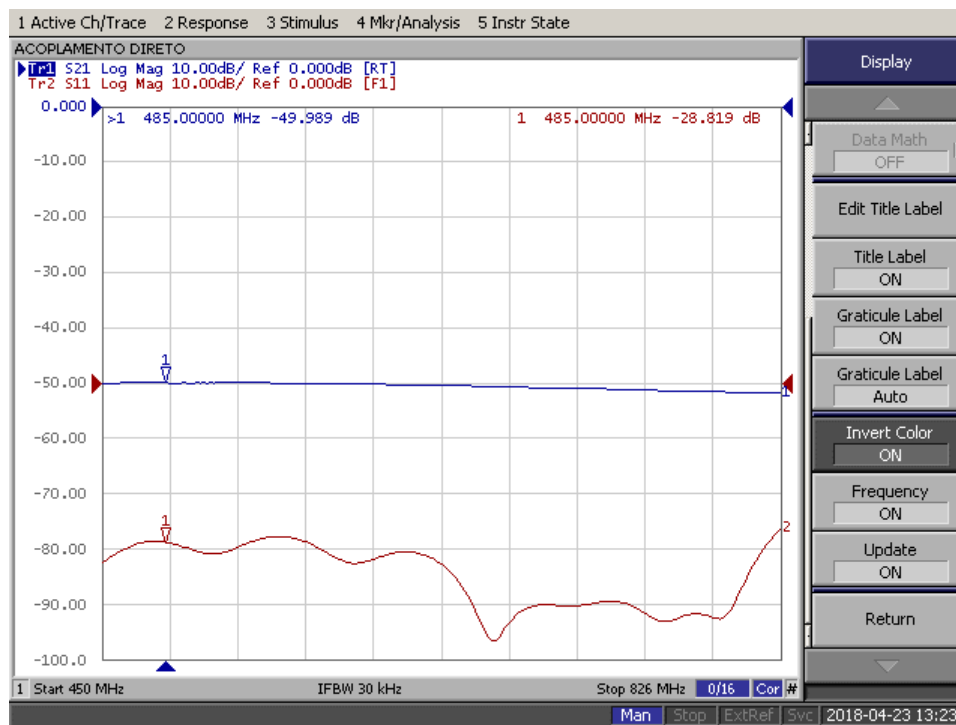
MEDIDAS DO FILTRO



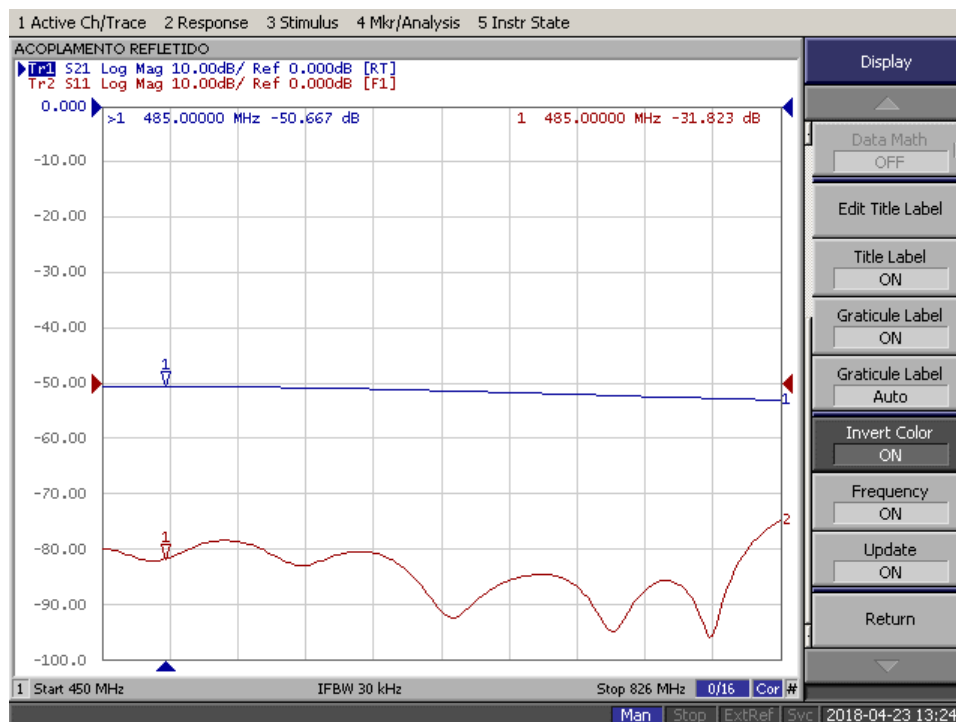
FILTRO MODELO – COMTECH – A-FC8D80C-EE - SN: 1744-205637 – MEDIDA NO NETWORK ANALIZER



FILTRO MODELO – COMTECH – A-FC8D80C-EE - SN: 1744-205637 – MEDIDA NO NETWORK ANALIZER



SONDA DE AMOSTRAGEM - A - MOD 40107 - MEDIDA NO NETWORK ANALYZER



SONDA DE AMOSTRAGEM - B - MOD 40107 - MEDIDA NO NETWORK ANALYZER

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LEITURAS DO TRANSMISSOR – PELA PORTA ETHERNET (DIGI)



HITACHI
Inspire the Next

ISDB-TB Tx
Ch. 16 / EC704MP

E-Compact

Alarms Setup Measurements Power Remote User

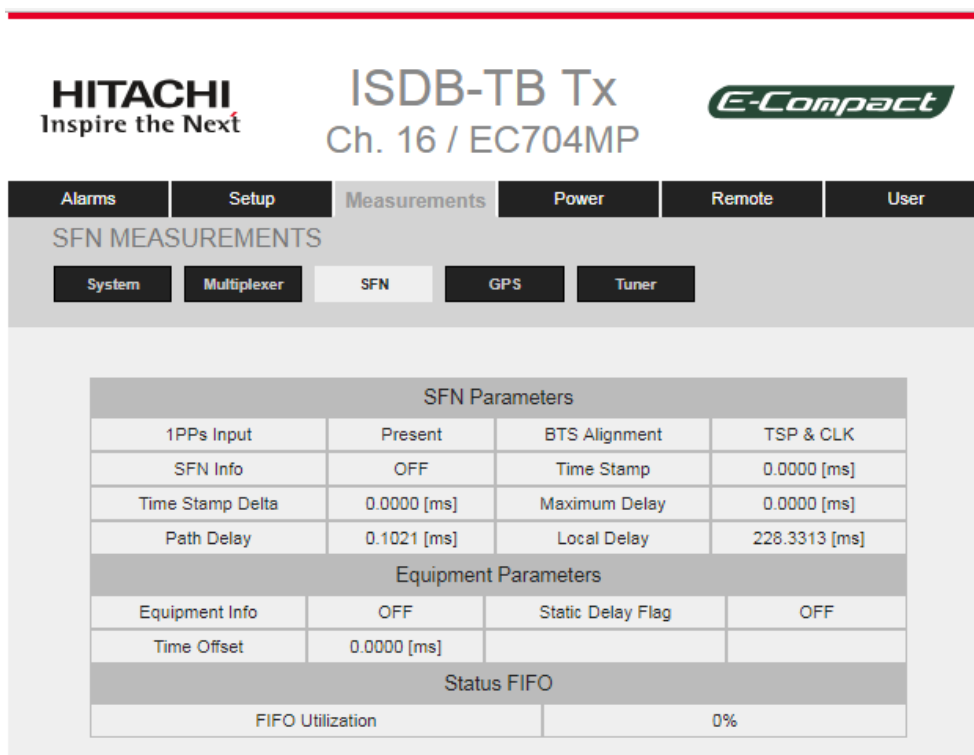
SYSTEM ALARMS

Alarms Alarm Log Download

System Alarms

System Alarms

ALARME



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Ch. 16 / EC704MP

E-Compact

Alarms Setup Measurements Power Remote User

SFN MEASUREMENTS

System Multiplexer SFN GPS Tuner

SFN Parameters

1PPs Input	Present	BTS Alignment	TSP & CLK
SFN Info	OFF	Time Stamp	0.0000 [ms]
Time Stamp Delta	0.0000 [ms]	Maximum Delay	0.0000 [ms]
Path Delay	0.1021 [ms]	Local Delay	228.3313 [ms]

Equipment Parameters

Equipment Info	OFF	Static Delay Flag	OFF
Time Offset	0.0000 [ms]		

Status FIFO

FIFO Utilization	0%

SFN

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Ch. 16 / EC704MP*E-Compact*

Alarms

Setup

Measurements

Power

Remote

User

MULTIPLEXER MEASUREMENTS

System

Multiplexer

SFN

GPS

Tuner

Transport Stream

Input Status

BTS IN / ASI 1

Current TMCC

Layer	Modulation	Code Rate	Interleaving	Segments
A	64QAM	7/8	2	13
B	---	---	---	---
C	---	---	---	---
Guard Interval		1/16	Mode	3

MUX

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Ch. 16 / EC704MP*E-Compact*

Alarms

Setup

Measurements

Power

Remote

User

INTERNAL GPS MEASUREMENTS

System

Multiplexer

SFN

GPS

Tuner

Internal GPS Measurements

Connected	ON
Locked	ON
UTC	15:52 23/05/2018
Satellite Following	12

GPS

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Inspire the NextISDB-TB Tx
Ch. 16 / EC704MP*E-Compact*

Alarms

Setup

Measurements

Power

Remote

User

TUNER MEASUREMENTS

System

Multiplexer

SFN

GPS

Tuner

Satelital Tuner

L.O. Frequency	5150 [MHz]
Channel Frequency	3884 [MHz]
Symbol Rate	4.762 [Mbps]
Polarity	Vertical
LNB Supply	On
SNR	6.2 [dB] Locked
PER (DVB-S2)	+0.00E+0

TUNER

HITACHI
Inspire the NextISDB-TB Tx
Ch. 16 / EC704MP

E-Compact

Alarms

Setup

Measurements

Power

Remote

User

POWER AMPLIFIER 1

Power 01

Measurement

Cur. Alarms

Past Alarms

Celsius

Fahrenheit

Power Supply 1 Measurements

Input Voltage	201.6 [Vac]	Temperature	35.4 [°C]	Software Version	PAM30001v1.05
Output Voltage	50.8 [Vdc]	Output Current	11.60 [A]		

Power Supply 2 Measurements

Input Voltage	199.7 [Vac]	Temperature	36.6 [°C]	Software Version	PAM30001v1.05
Output Voltage	50.9 [Vdc]	Output Current	12.91 [A]		

Driver Measurements

Input Voltage	50.4 [V]	Pre Driver Curr.	0.20 [A]	Temperature	41.6 [°C]
Driver Current	1.74 [A]	Software Version	PAM30001v1.05		

Power Amplifiers Measurements

Module	Current [A]	Temperature [°C]	Vgs Feedback [V]	Software Version
PA1	7.57	55.6	1.574	PAM30001v1.05
PA2	2.92	50.6	0.826	PAM30001v1.05
PA3	8.98	60.1	1.550	PAM30001v1.05
PA4	2.53	49.1	0.829	PAM30001v1.05

General Measurements

Input Air Temp.	26.0 [°C]	FAN1 Rotation	6840 [rpm]	PSU Voltage	50.00 [V]
FWD Power	372 [W]	FAN2 Rotation	6780 [rpm]	Current Carrier	1.40 [A]
RFD Power	0 [W]	FAN3 Rotation	6900 [rpm]	VGS Peak	0.80 [V]
Software Version	PAM40002v1.03	FAN Rotation [%]	45%		

GAVETA DE POTÊNCIA

Laudo de Medidas de Transmissor Digital
ISDB-TB _Máscara Crítica

192.168.100.18/#measurements/system

HITACHI
Inspire the NextISDB-TB Tx
Ch. 16 / EC704MP

E-Compact

Alarms

Setup

Measurements

Power

Remote

User

SYSTEM MEASUREMENTS

System

Multiplexer

SFN

GPS

Tuner

System Information			
System ID		ISDB-TB Tx /0	
Standard		ISDB-Tb	
Operational Power		300W	
uC Software Version		IS5A0007v1.44	
FPGA Version		IS2S0004v1.20F	
Digi Software Version		ISDG0008v1.08	
CAM Software Version		CA2C0001V2.01	
Hardware Version		CIP 8753E / CIM 3930G	
Transmitter			
Automatic Level Control		ON	
ASI Restart		Automatic	
Non-Linear Pre-Correction		ON	
Power			
Programmed		300.0 [W]	
Forward		300.0 [W]	
Reflected		00.0 [W]	
ALC Reference Voltage		5.36 [V]	
Reflectometer Voltage		3.56 [V]	
Exciter Power Supply			
+ 3.3 V	OK	+ 15 V	OK
+ 5 V	OK	+ 28 V	OK
Communication Status			
Power 1	OK		

MEDIDAS DO EQUIPAMENTO

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Laudo de Medidas de Transmissor Digital ISDB-TB _Máscara Crítica

LAUDO DE ENERGIA

ALIMENTAÇÃO DO TRANSMISSOR:

180 - 240 Vac

Normal Mode Uover: ■ ■ ■ ■ I1-3 :100mVrms Auto YOKOGAWA ◆
Iover: ■ ■ ■ ■ Integ:Reset

⊞ & change items

U _{rms1}	209.990	V
I _{rms1}	6.8725	A
P1	1.42072	kW
S1	1.44314	kVA
Q1	-0.25283	kvar
λ1	0.98446	

Update 125

PAGE Σ A(3P4W)
U1 300Vrms
I1A100mVrms
U2 300Vrms
I2A100mVrms
U3 300Vrms
I3A100mVrms
Element4
U4 300Vrms
I4 200mVrms
Integ:Reset
Time
-----:--:--

MEDIDA DE TENSÃO, CORRENTE, POTÊNCIA ,COS φ , POTÊNCIA APARENTE E POTÊNCIA REATIVA

Wide-Band Harmonics Uover: ■ ■ ■ ■ PLL Source: U1 YOKOGAWA ◆
Iover: ■ ■ ■ ■

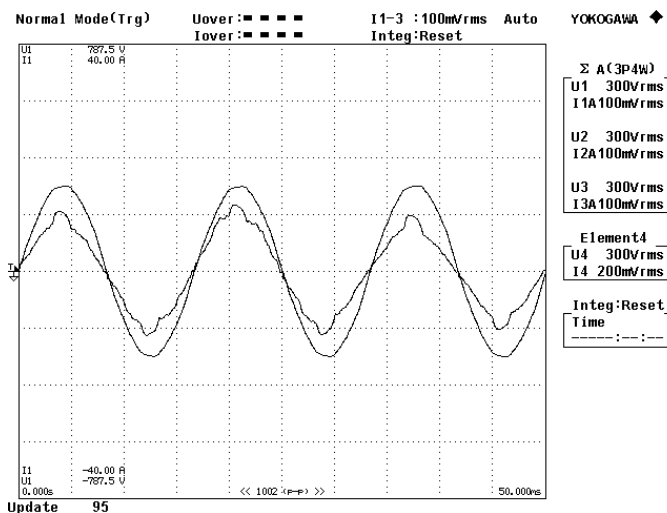
⊞ & change items

I _{thd1}	9.164	%

Update 5

PAGE Σ A(3P4W)
U1 300V
I1A100mV
U2 300V
I2A100mV
U3 300V
I3A100mV
Element4
U4 300V
I4 200mV

MEDIDA DE HARMÔNICO



MEDIDA DE TENSÃO E CORRENTE