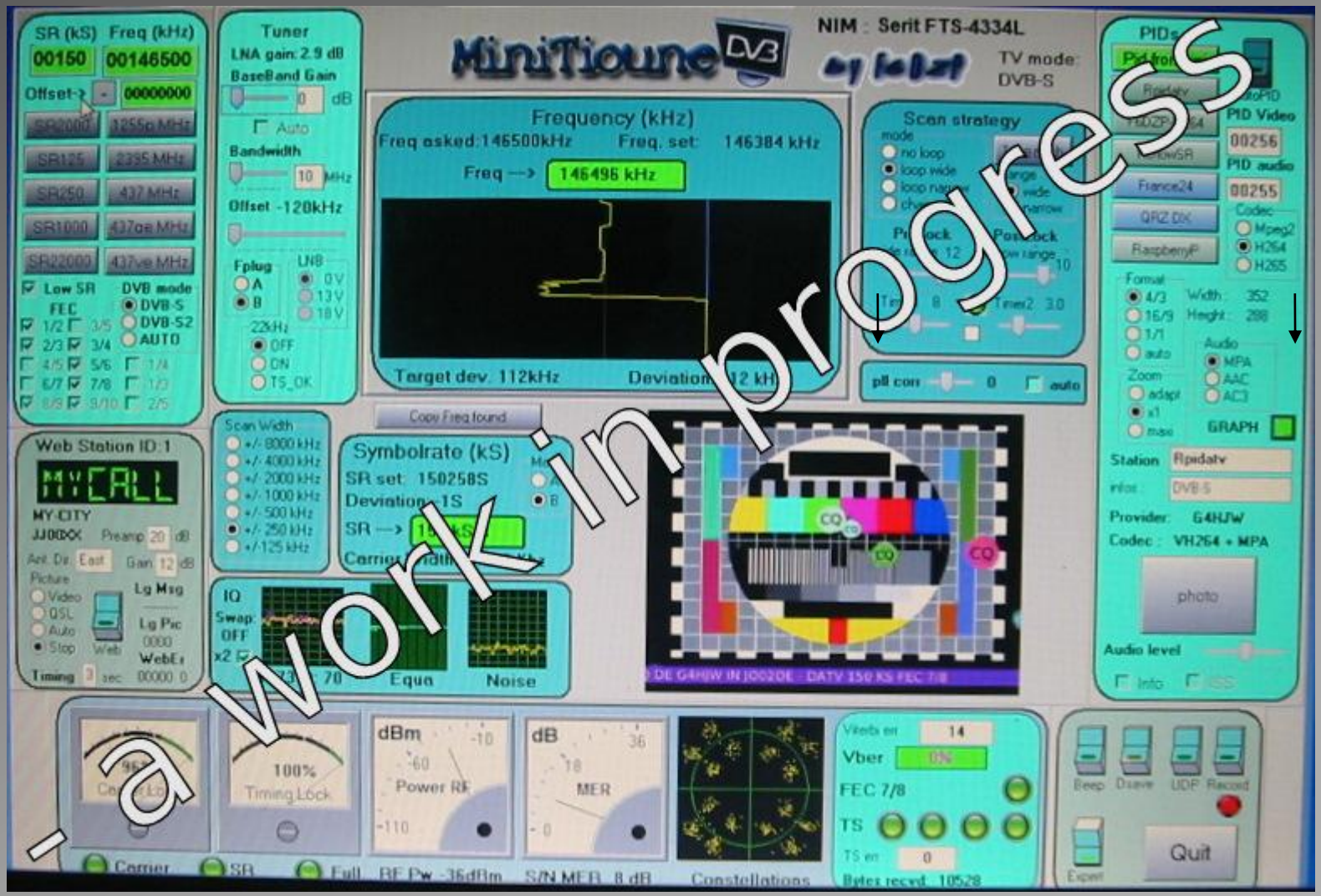
Optical DATV



Background...

Transmit signal generation

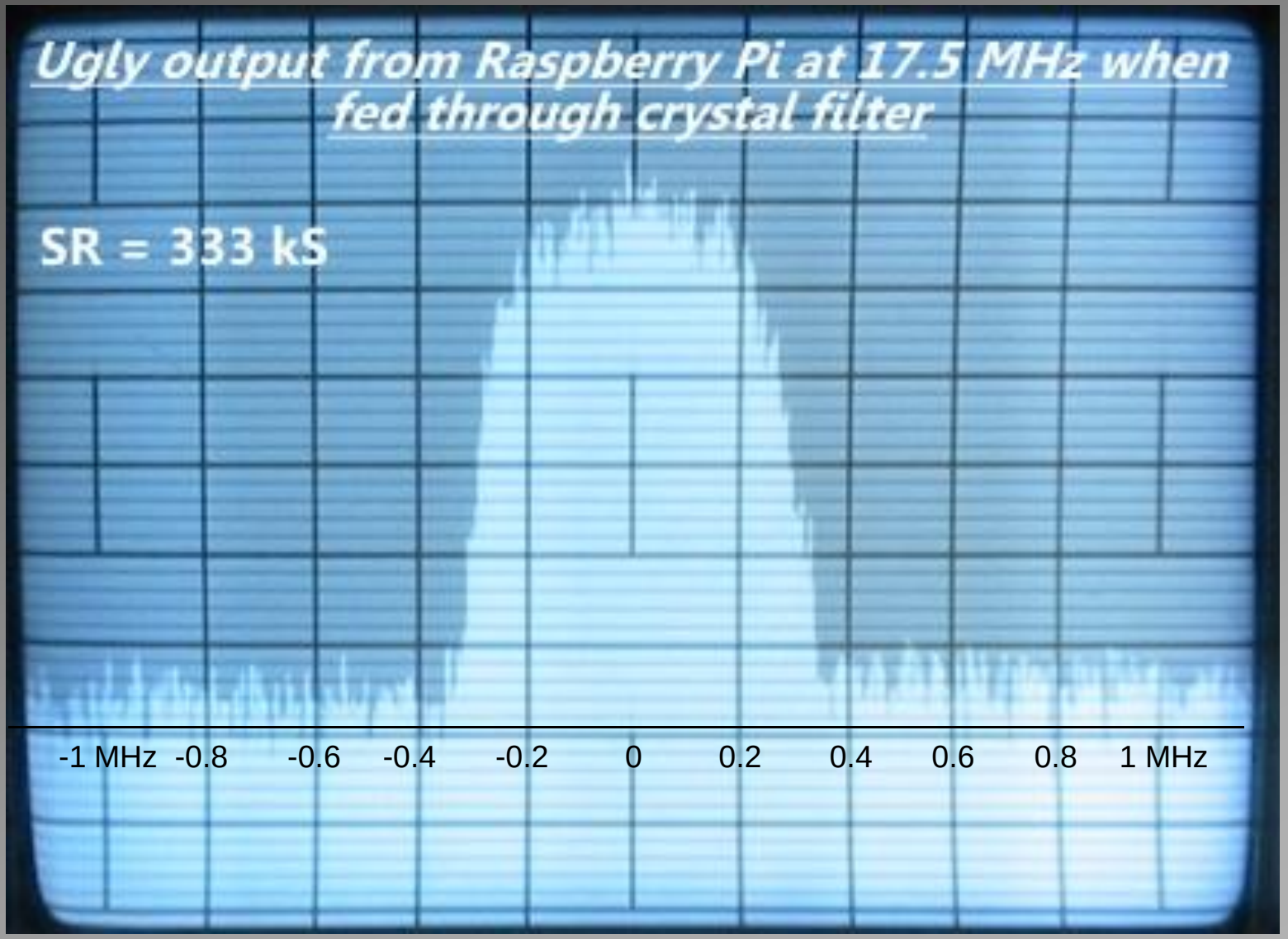
Options:

a) Update software to output a B/B Transport stream (post error correction coding).

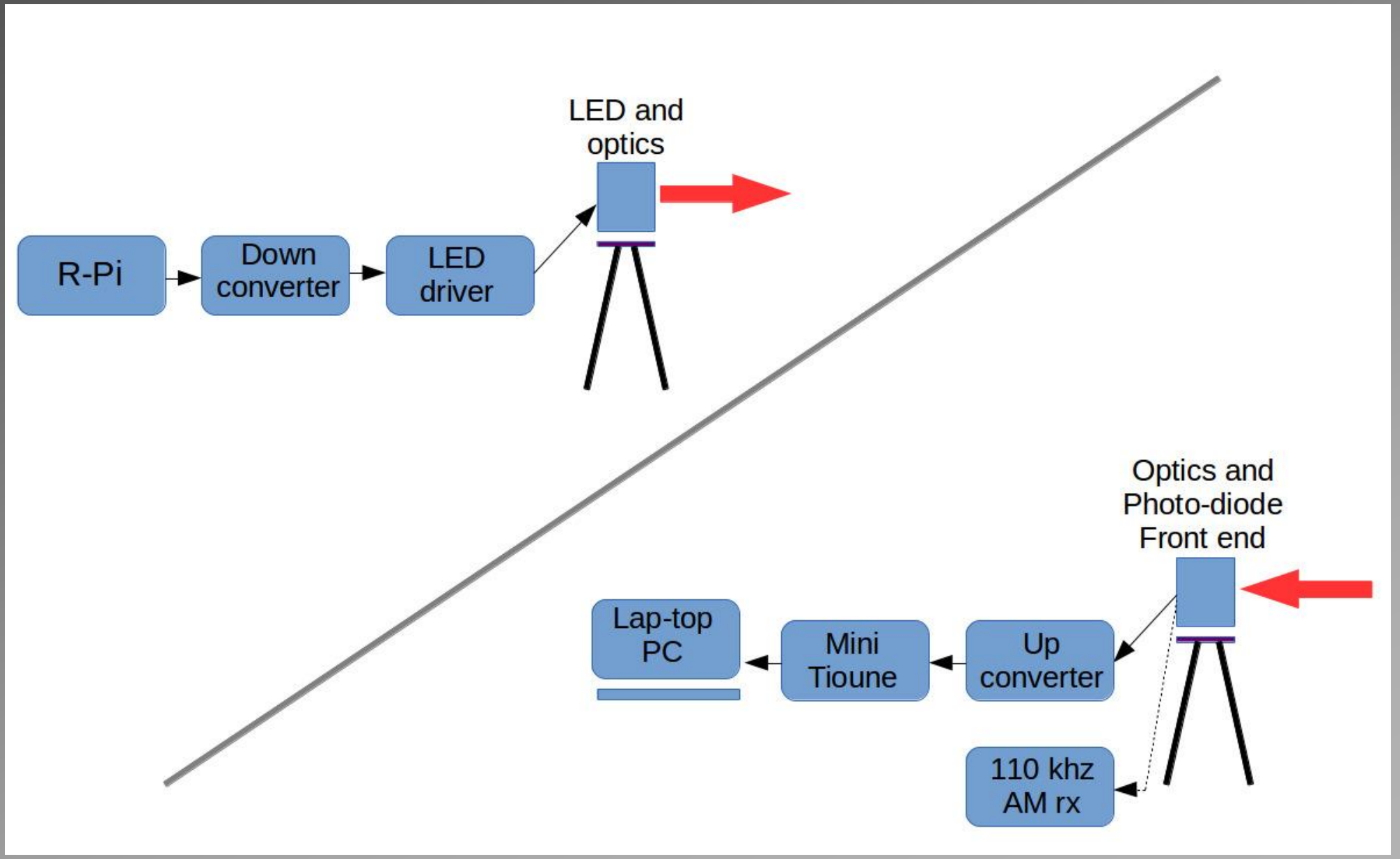
b) Use existing I/Q outputs and quadrature modulator to produce a quasi-B/B signal.

c) Down-convert 'ugly' output to produce a quasi-B/B signal.

At SR = 333 kS/s, the output from the crystal filter would be ideal for up-converting to 2m...

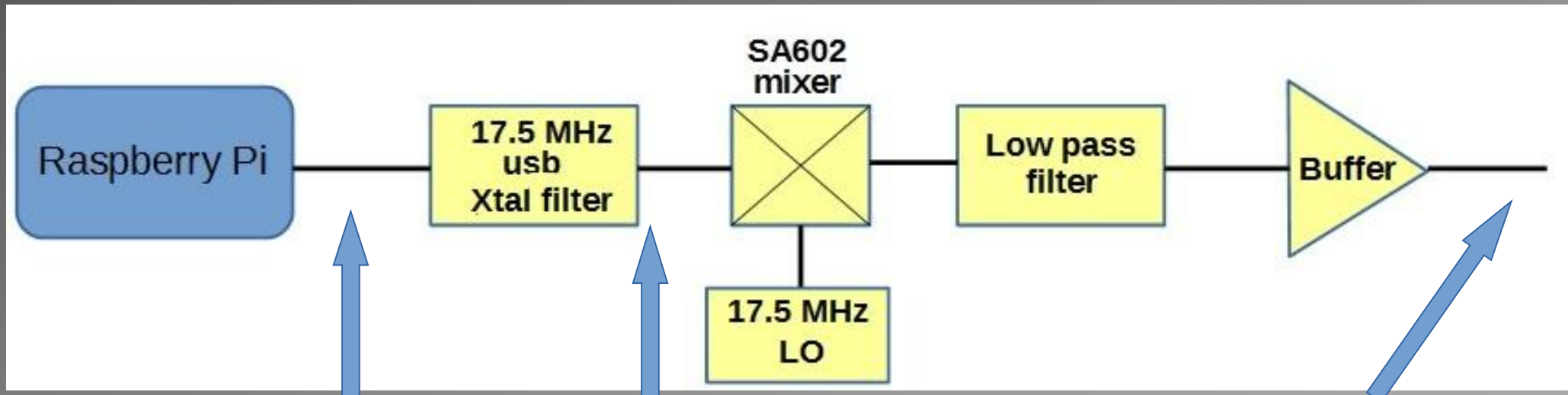


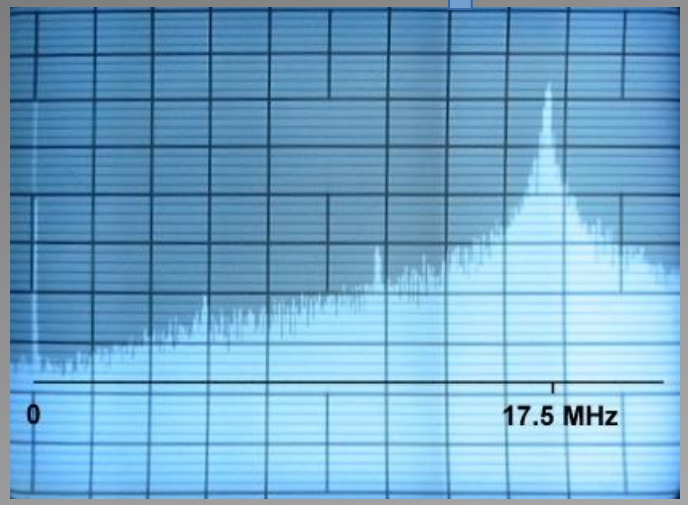
Overall set-up

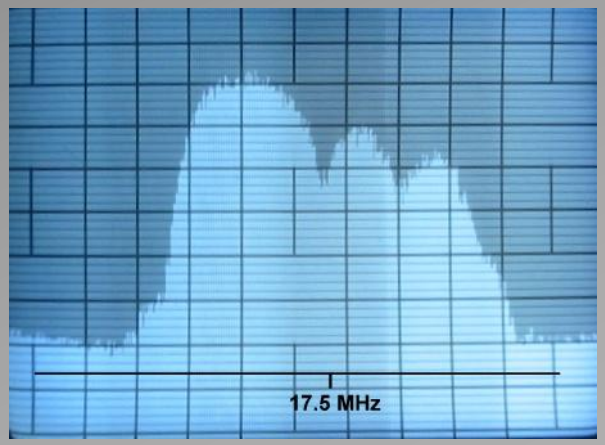


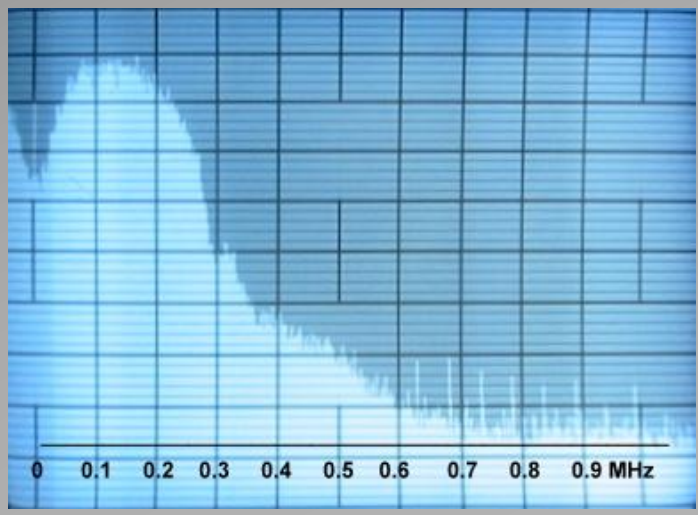
Transmit exciter

Transmit signal generation

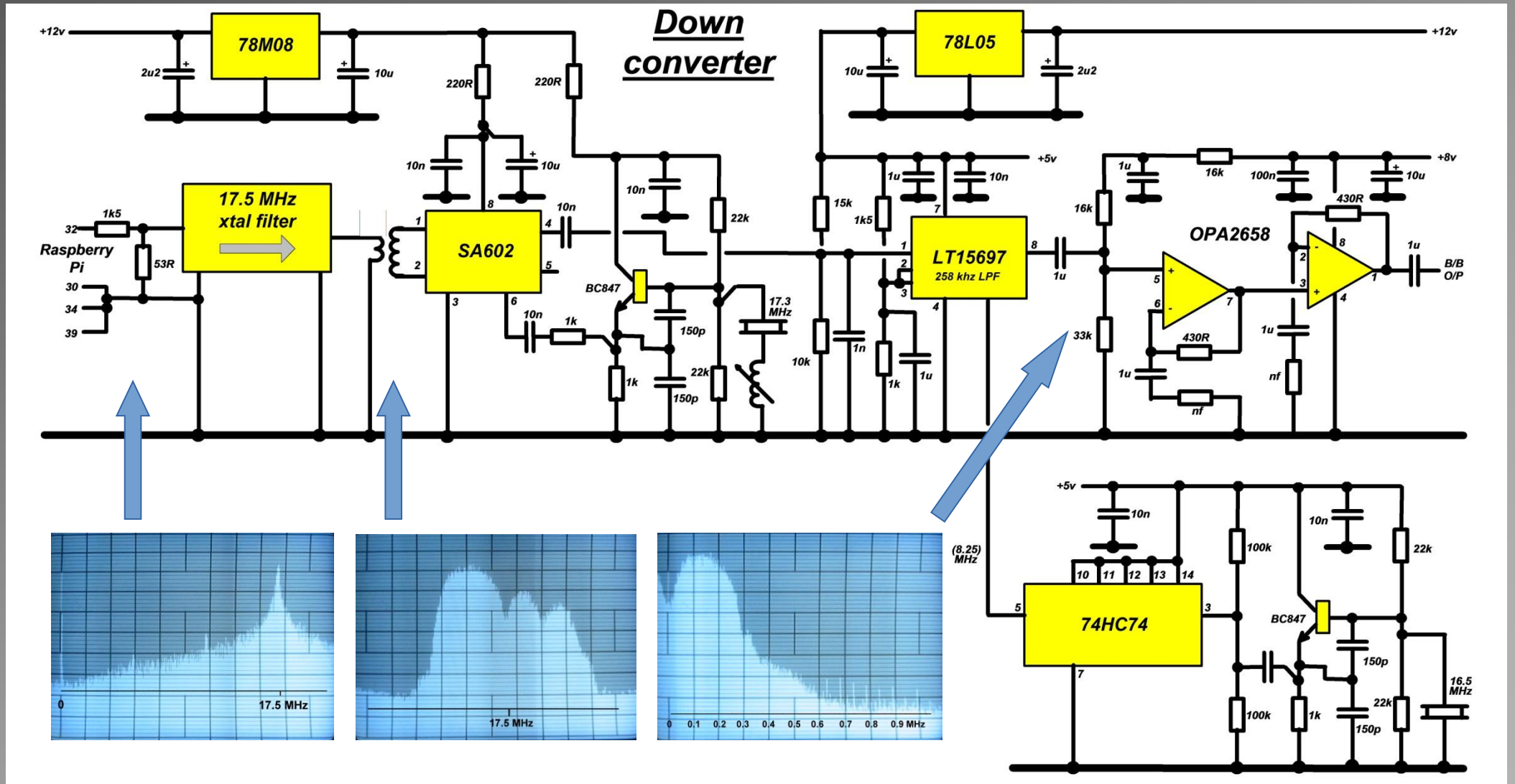


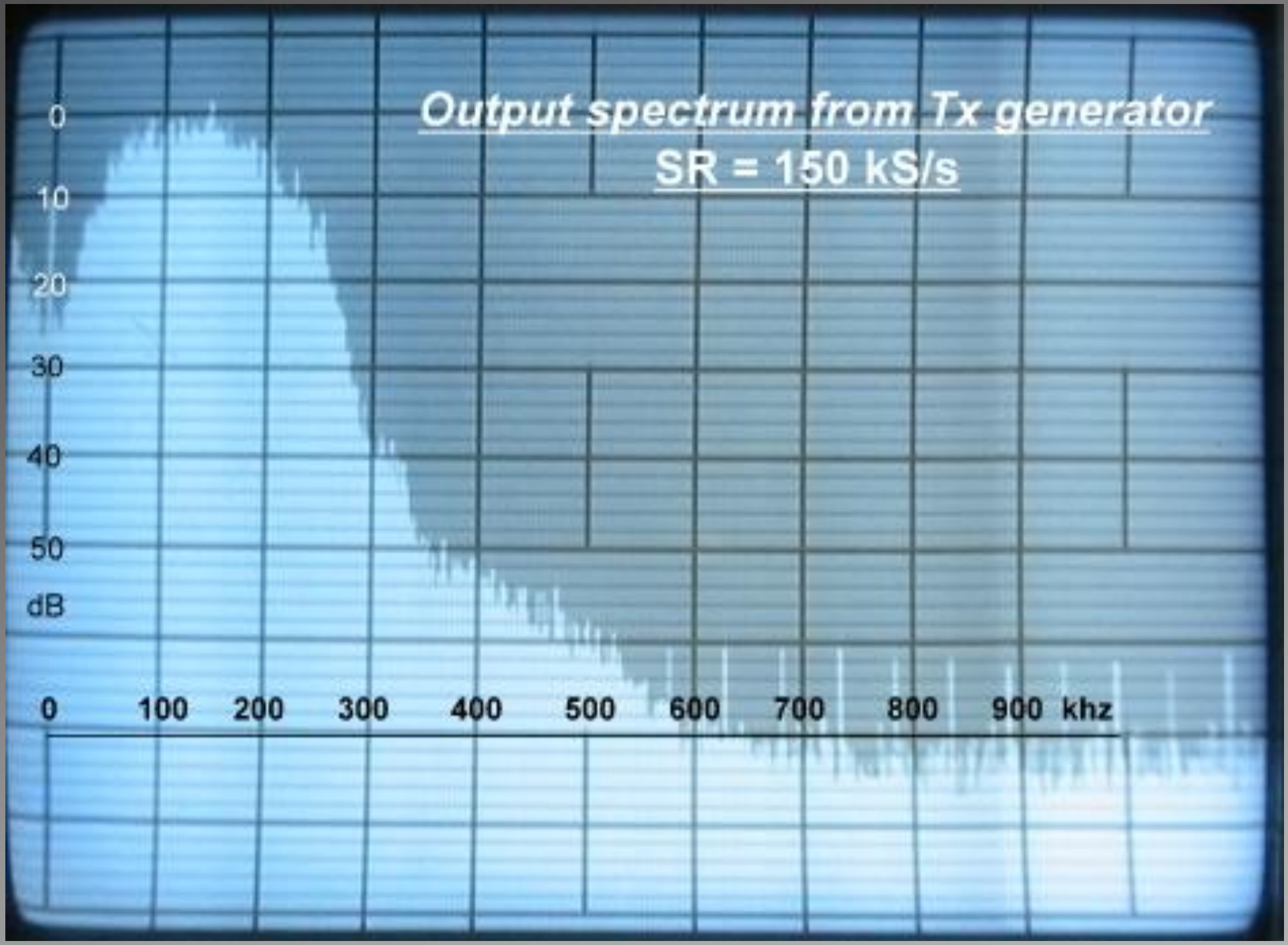






Transmit signal generation - schematic




Output spectrum from Tx generator
SR = 150 kS/s
0
10
20
30
40
50
dB
0
100
200
300
400
500
600
700
800
900
khz

Two of the more common red LEDs:

Goldon Dragon series

LR W5AM, LA W5AM, LY W5AM

1.4 Watts

Vorläufige Daten / Preliminary Data

Besondere Merkmale

- **Gehäusetyp:** weißes SMD-Gehäuse, farbloser klarer Silikon - Verguss, klare Silikonlinse
- **Typischer Lichtfluss:** 53 lm (rot); 60 lm (amber); 48 lm (gelb)
- **Besonderheit des Bauteils:** hocheffiziente Lichtquelle bei geringem Platzbedarf
- **Wellenlänge:** 625 nm (rot), 617 nm (amber), 590 nm (gelb)
- **Abstrahlwinkel:** 170°
- **Technologie:** Dünnfilm InGaAlP
- **optischer Wirkungsgrad:** 59 lm/W (rot), 67 lm/W (amber), 53 lm/W (gelb)
- **Gruppierungsparameter:** Lichtstrom, Wellenlänge
- **Verarbeitungsmethode:** für alle SMT-Bestücktechniken geeignet
- **Lötmethode:** Reflow Löten
- **Vorbehandlung:** nach JEDEC Level 4
- **Gurtung:** 24-mm Gurt mit 800/Rolle, ø180 mm
- **ESD-Festigkeit:** ESD-sicher bis 2 kV nach JESD22-A114-D

Features

- **package:** white SMD package, colorless clear silicone resin, clear silicone lens
- **typical Luminous Flux:** 53 lm (red); 60 lm (amber); 48 lm (yellow)
- **feature of the device:** high efficient lightsource at low space
- **wavelength:** 625 nm (red), 617 nm (amber), 590 nm (yellow)
- **viewing angle:** 170°
- **technology:** Thinfilm InGaAlP
- **optical efficiency:** 59 lm/W (red), 67 lm/W (amber), 53 lm/W (yellow)
- **grouping parameter:** luminous flux, wavelength
- **assembly methods:** suitable for all SMT assembly methods
- **soldering methods:** Reflow soldering
- **preconditioning:** acc. to JEDEC Level 4
- **taping:** 24-mm tape with 800/reel, ø180 mm
- **ESD-withstand voltage:** up to 2 kV acc. to JESD22-A114-D

Anwendungen

- Verkehrssignale
- Hinterleuchtung (Werbebeleuchtung, Allgemeinbeleuchtung)
- Ersatz von Kleinst-Glühlampen
- Tragbare Beleuchtung z. B. am Fahrrad
- Dekorative Lichtleiter-Anwendungen
- Signal- und Symbolleuchten zur Orientierung
- Markierungsbeleuchtung (z.B. Stufen, Fluchtwege, u.ä.)
- Fassadenbeleuchtung im Innen- und

Applications

- traffic signaling
- backlighting (illuminated advertising, general lighting)
- substitution of micro incandescent lamps
- portable light souce (e. g. bicycle)
- decorative and entertainment lighting (incl. fiber optic illumination)
- signal and symbol luminaire for orientation
- marker lights (e.g. steps, exit ways, etc.)
- indoor and outdoor commercial and residential architectural lighting

Opto Semiconductors OSRAM

Phlatlight series

LUMINUS

PT-54-TE Product Datasheet

24 Watts

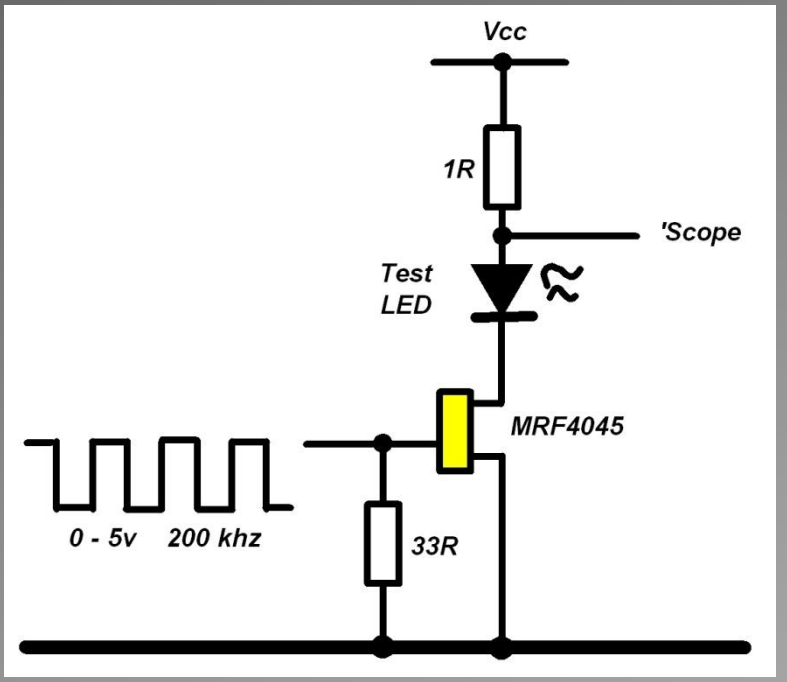
Optical & Electrical Characteristics

General Characteristics		Symbol	Red-Amber (Common Cathode)	Green	Blue	Unit
Emitting Area			5.4	5.4	5.4	mm^2
Emitting Area Dimensions			2.7 x 2.0	2.7x 2.0	2.7x 2.0	mmxmm
Characteristics at Reference Test Drive Current , I_f [1,2]						
Reference Duty Cycle [3]			25	50	25	%
Test Peak Drive Current [1,2,4]	typ	I_f	13.5	13.5	13.5	A
Peak Luminuous Flux [1,2,5]	typ	Φ_v	1485	2250	400	lm
Peak Radiometric Flux [1,2]	typ	Φ_r	5.3	4.8	9.0	W
Dominant Wavelength	min	λ_{dmin}	609	516	450	nm
	typ	λ_d	613	525	460	nm
	max	λ_{dmax}	620	540	468	nm
FWHM- Spectral bandwidth at 50% of Φv	typ		19	34	20	nm
Chromaticity Coordinates [6,7]	typ	x	0.676	0.167	0.147	
	typ	y	0.323	0.704	0.033	
Forward Voltage	min	$V_{F\,min}$	2.7	3.5	3.0	V
	typ	V_F	3.0	5.2	3.7	V
	max	$V_{F\,max}$	3.7	5.9	4.5	V
Dynamic Resistance	typ		0.05	0.08	0.05	Ω
Device Thermal Characteristics						
Thermal Coefficient of Photometric Flux	typ		-1.0	-0.2	~0	% / °C
Thermal Coefficient of Radiometric Flux	typ		-0.65	-0.2	-0.2	% / °C
Forward Voltage Temperature Coefficient	typ		-2.0	-3.3	-3	mV/ °C
Characteristics at Reference Continuous Drive Current I_F (continuous wave)[1]						
Reference Drive Current	typ	I_f	8.1	8.1	8.1	A
Luminous Flux	typ	Φ_v	830	1590	290	lm
Radiometric Flux	typ	Φ_r	3.0	3.2	5.9	W
Dominant Wavelength	typ	λ_d	613	528	461	nm
FWHM -Spectral bandwidth at 50% of Φv	typ		18	36	21	nm
Chromaticity Coordinates [6,7]	typ	x	0.675	0.177	0.144	nm
	typ	y	0.324	0.713	0.034	nm
Forward Voltage	typ	V_F	2.7	4.7	3.3	V

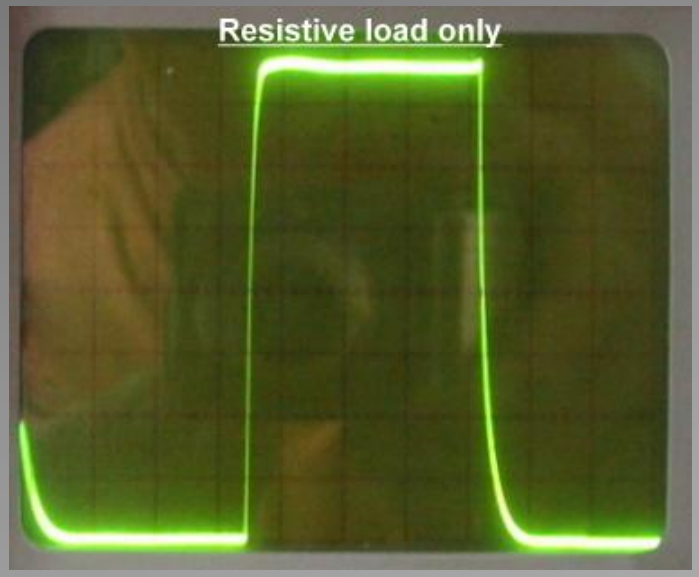
Luminus Devices, Inc. • T 978.528.8000 • www.luminus.com
175 New Boston Street • Woburn, MA 01801

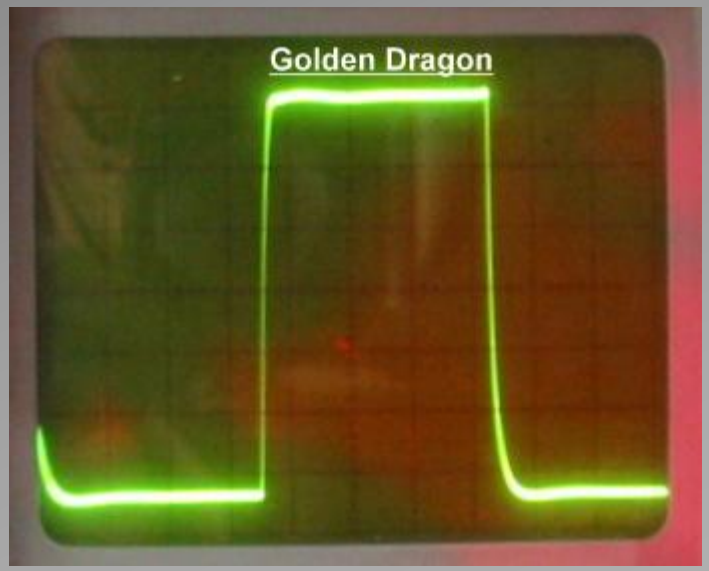
LED step change response

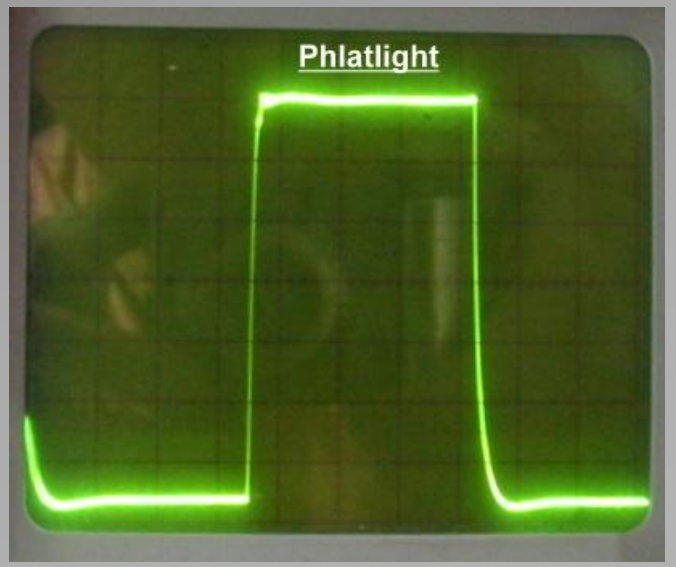
I = 2A peak f drive = 200 khz



Current waveform for test set-up reference and Golden Dragon and Phlatlight LED samples



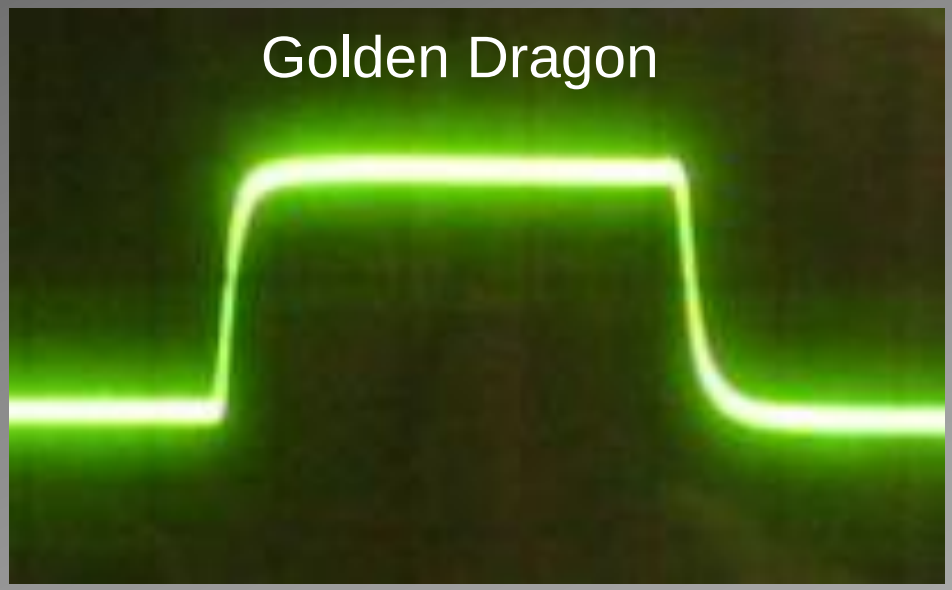




LED step change response

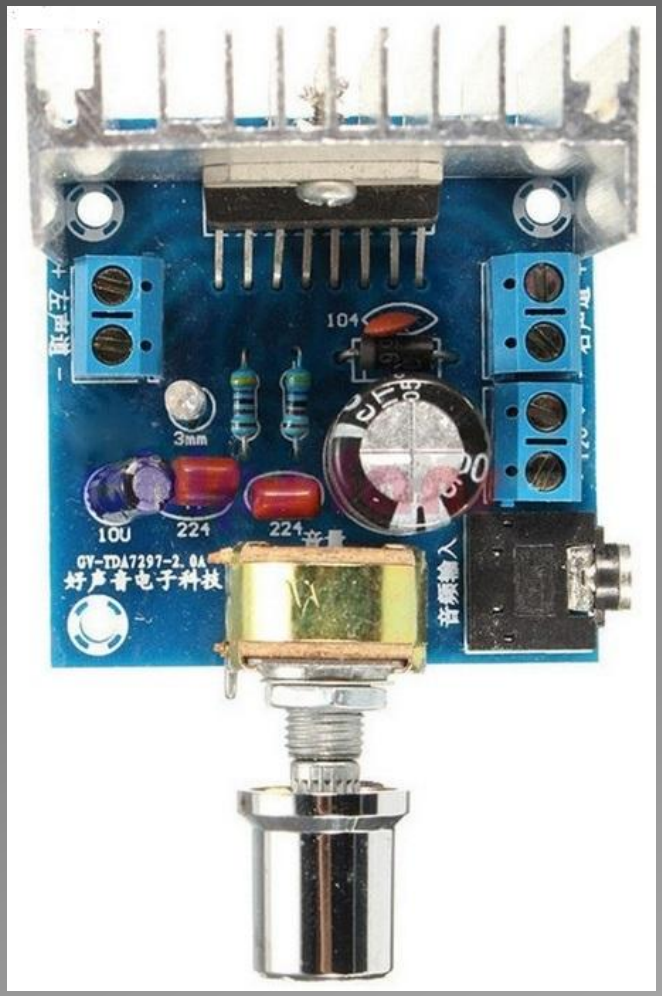
I = 2A peak f drive = 200 khz

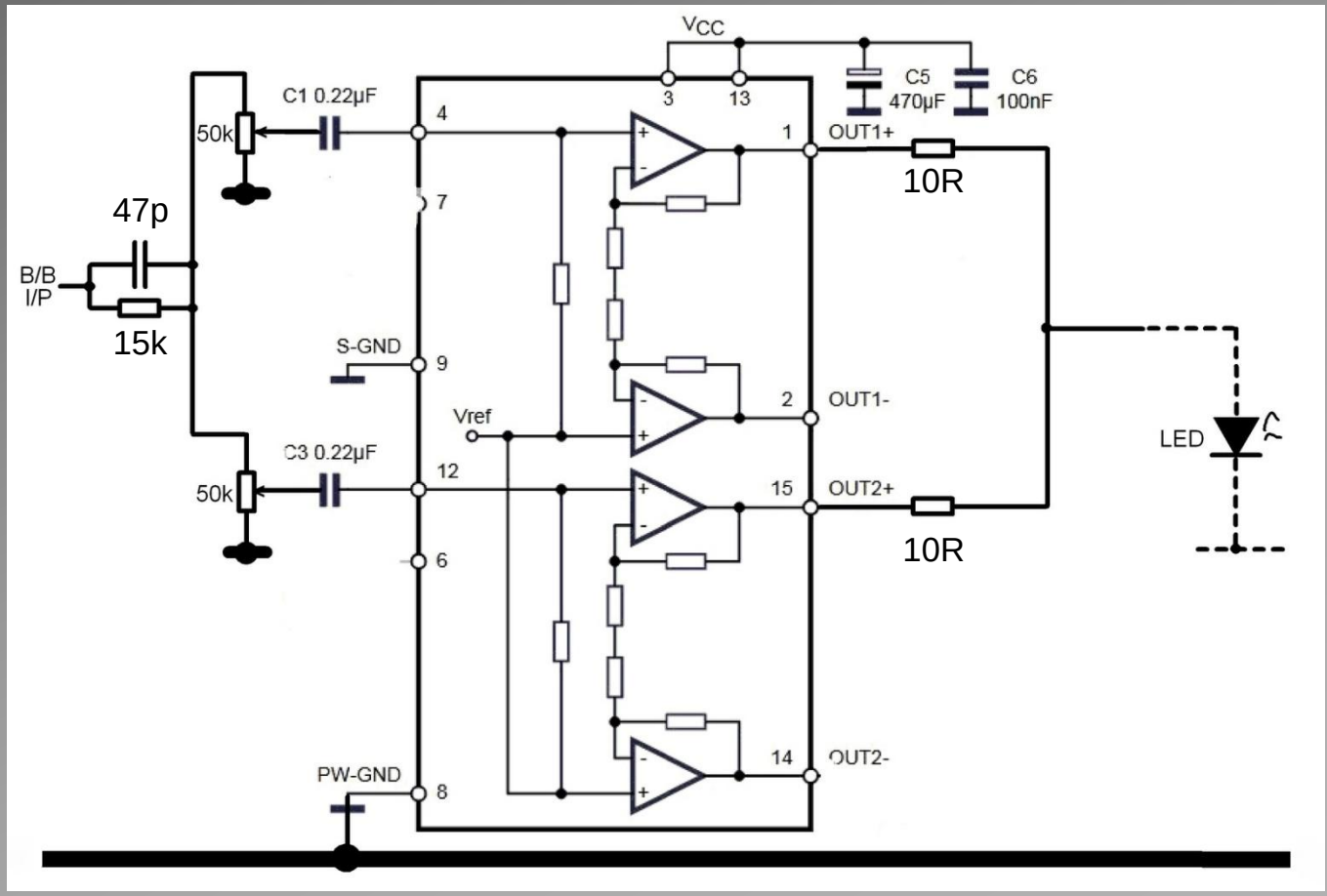
Detected optical response



3W LED driver

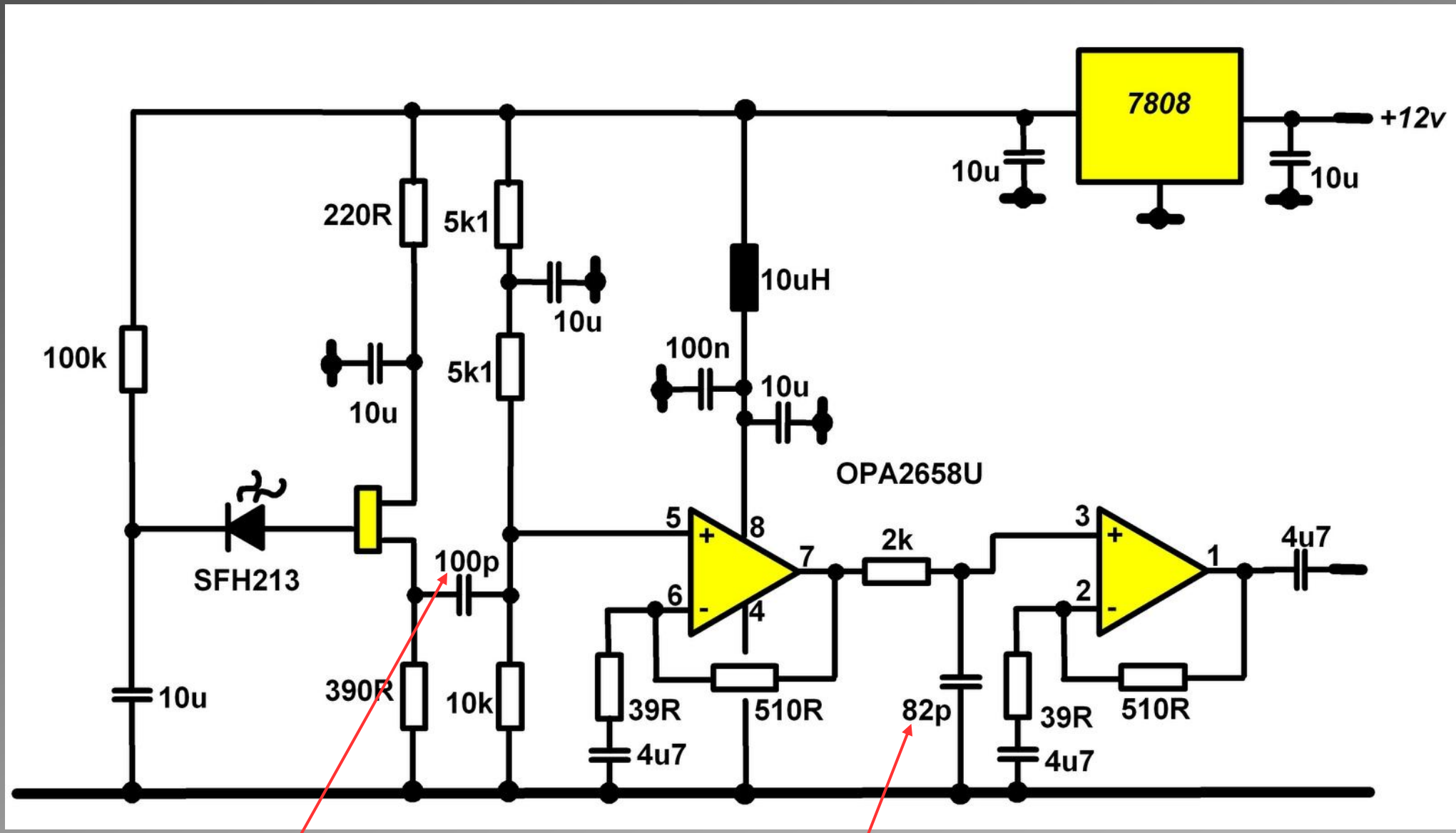
(using low cost TDA7297 ebay pcb)





Receiver up-converter

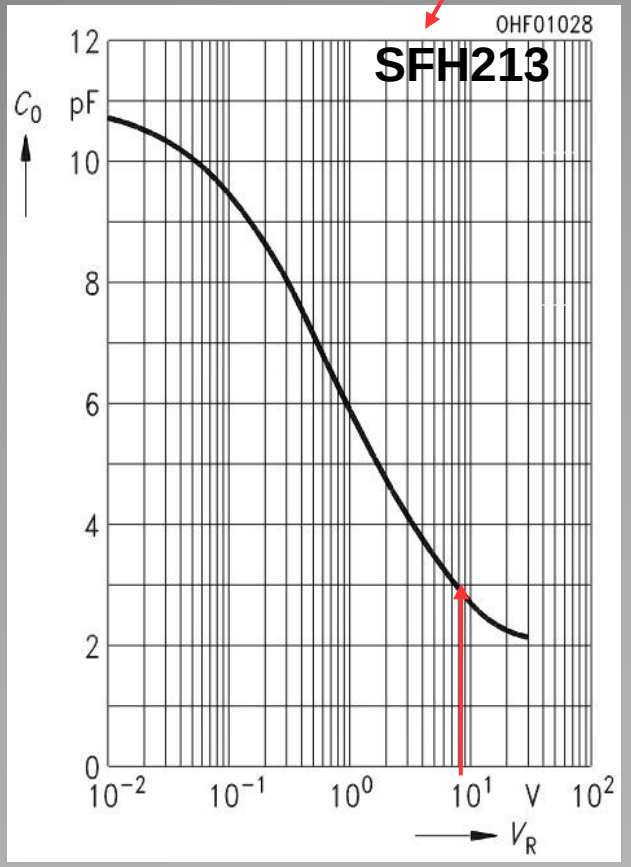
Receive head unit

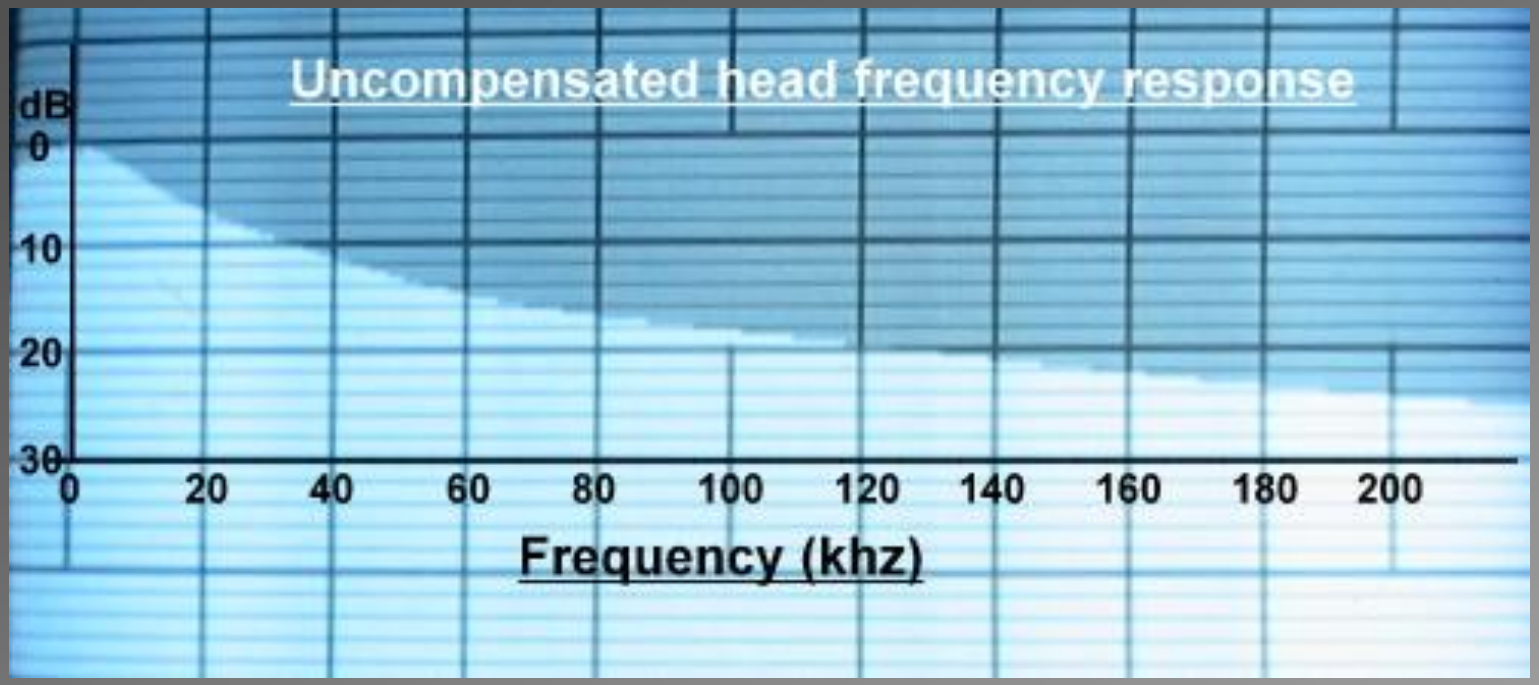


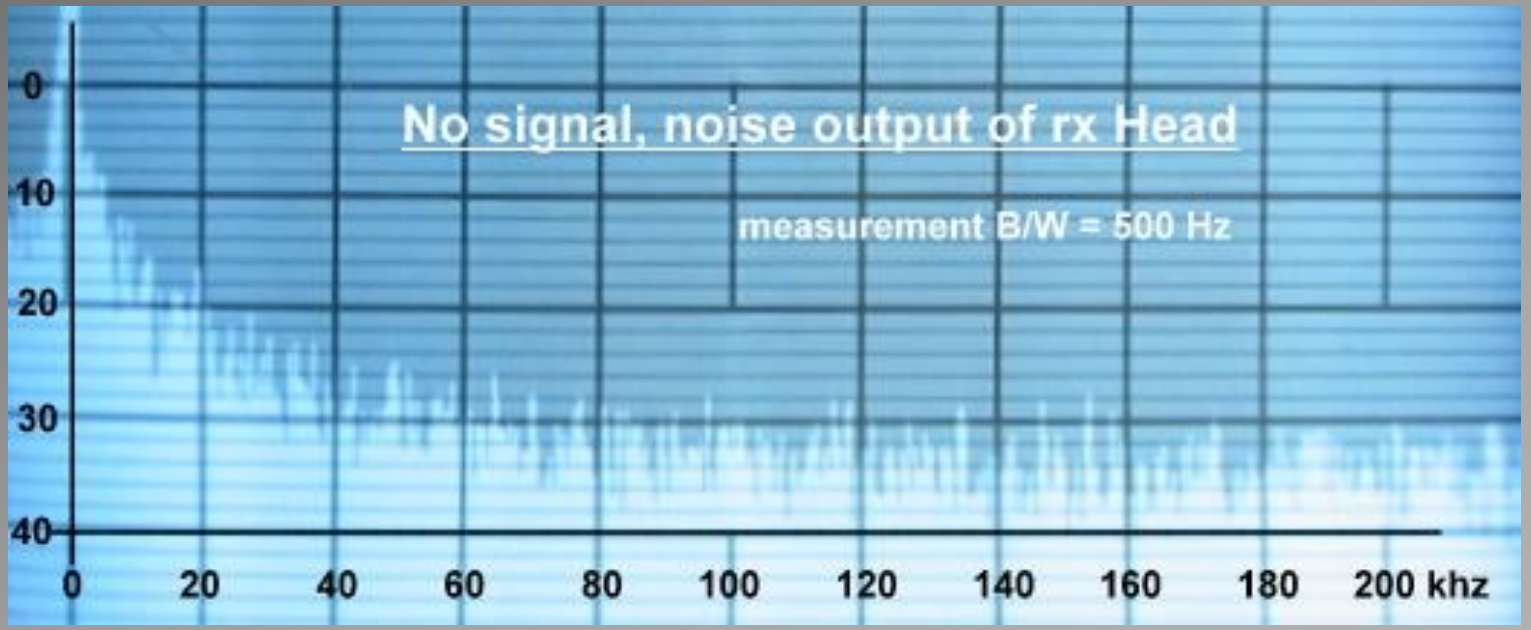
SFH213 capacitance with 8v reverse bias = 3 pF

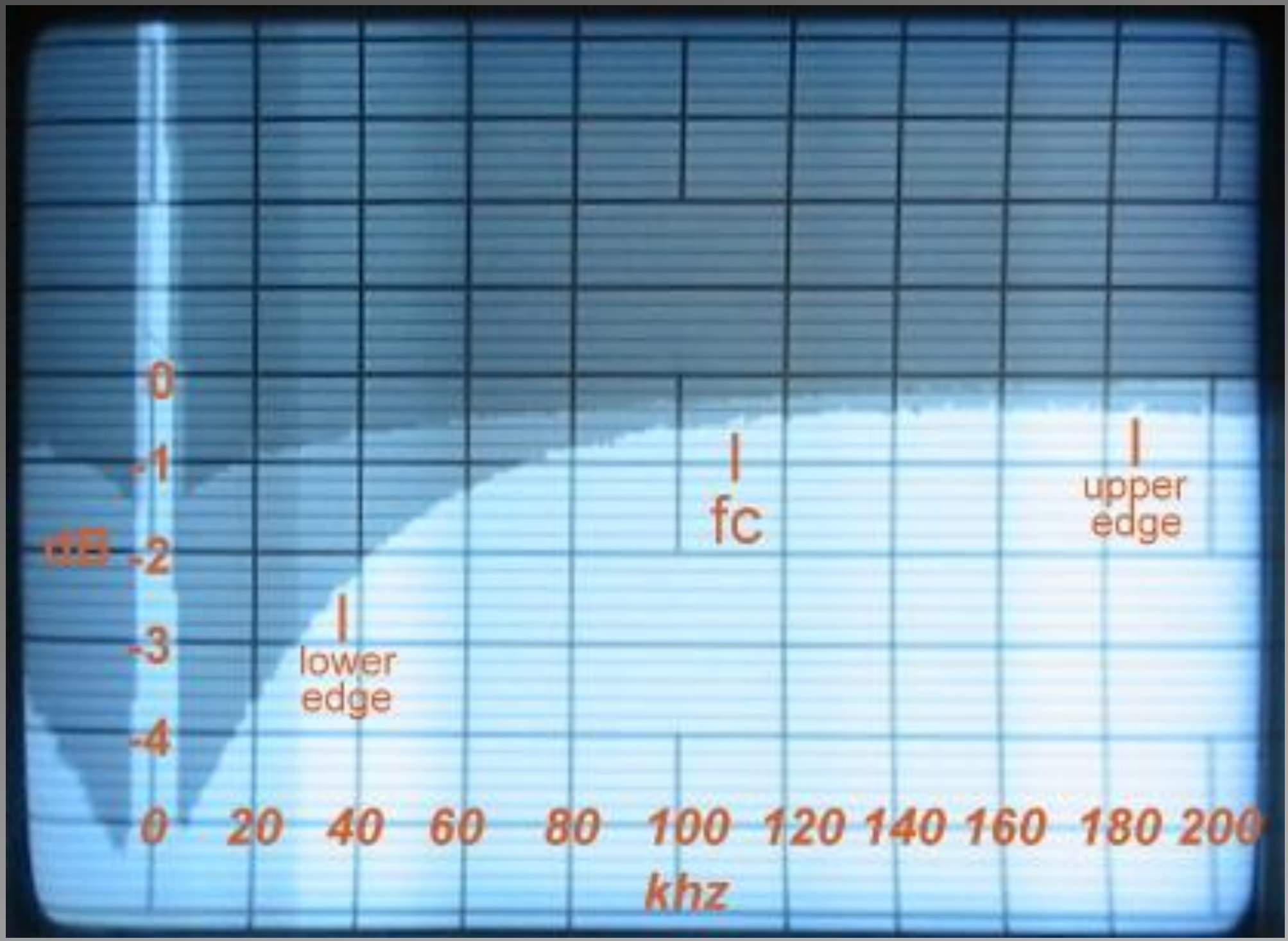
Xc at 1 khz = 53 M.ohm

And at 100 khz = 530 k

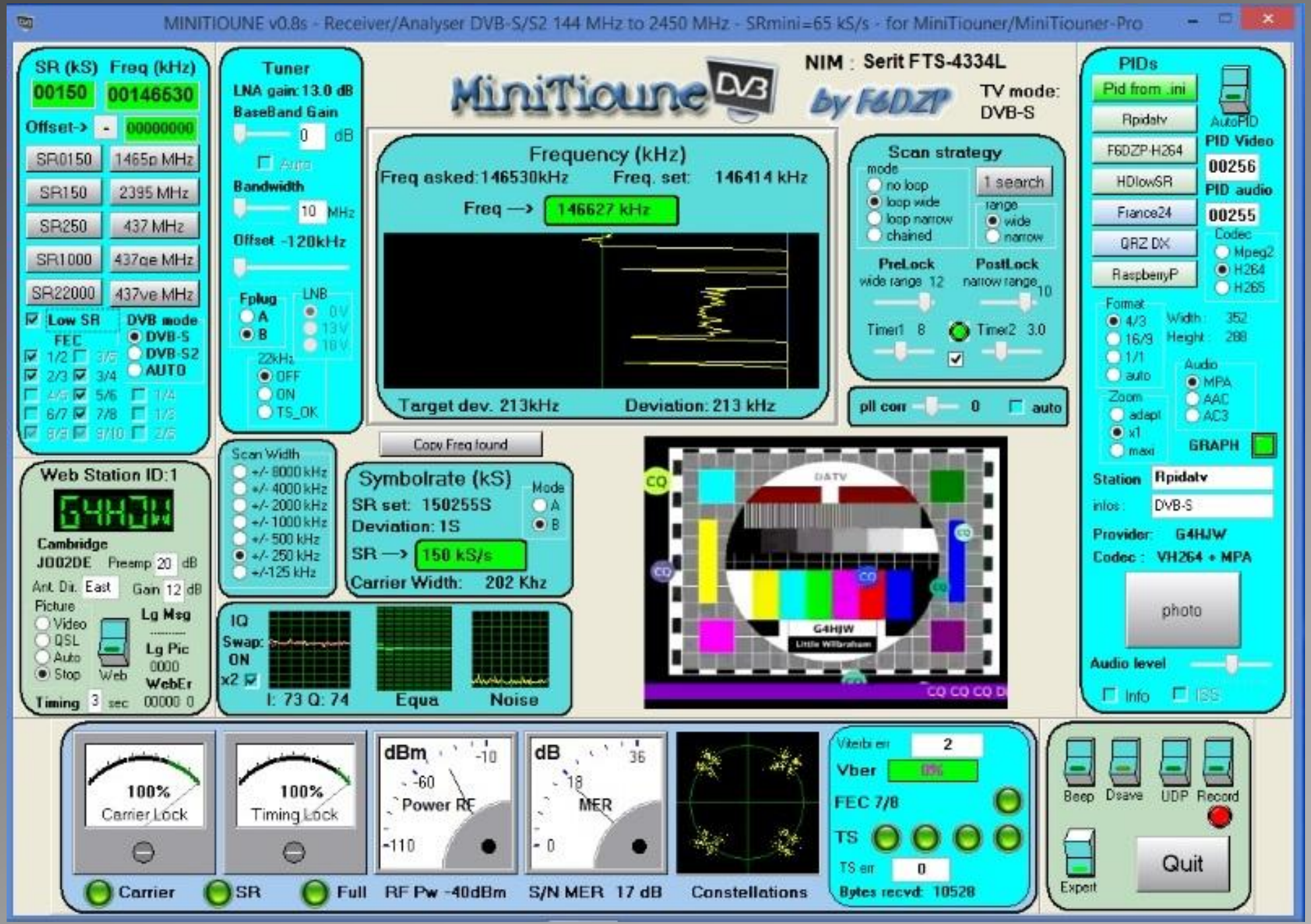



Uncompensated head frequency response
dB
0
10
20
30
0
20
40
60
80
100
120
140
160
180
200
Frequency (khz)

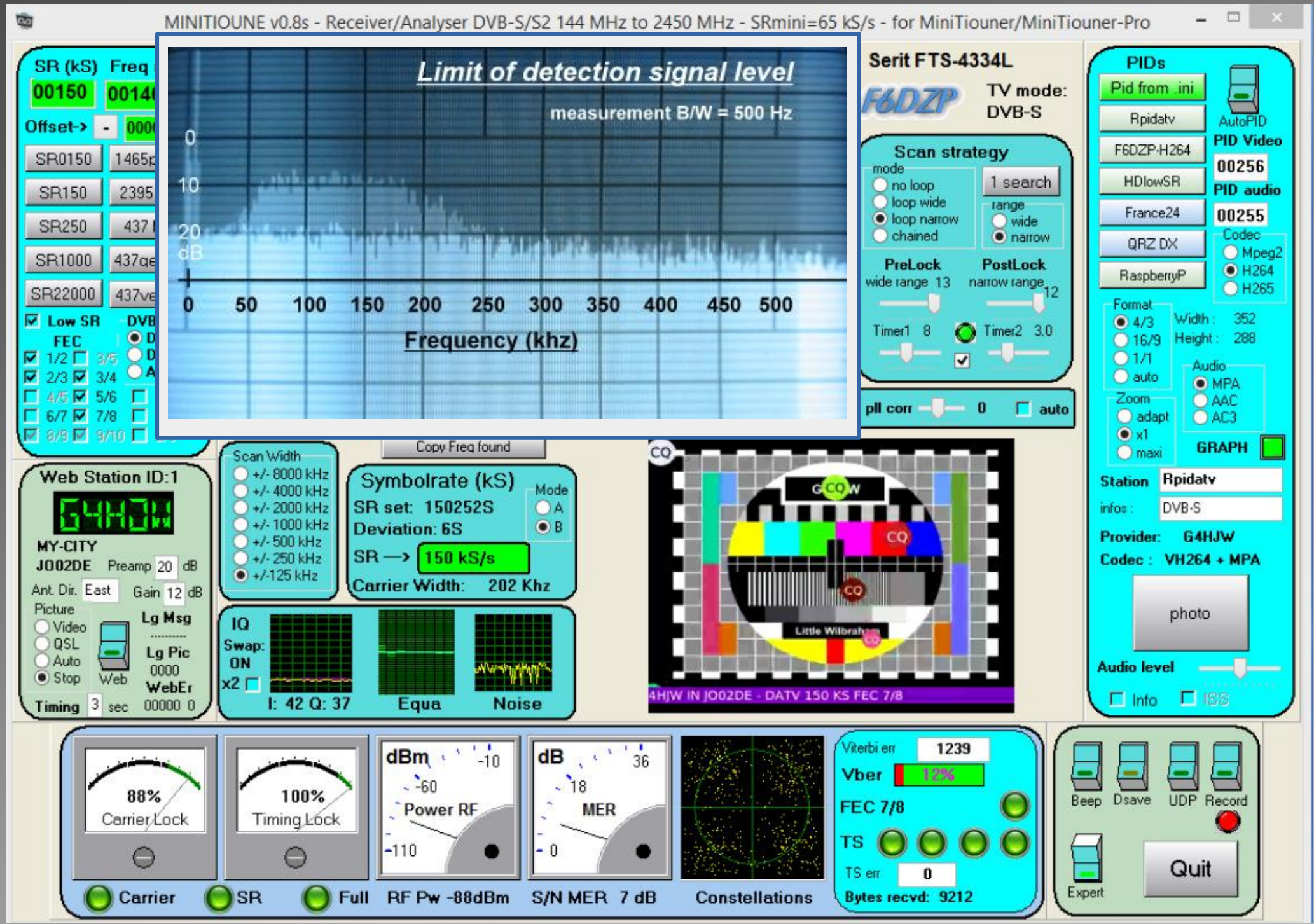

No signal, noise output of rx Head
measurement B/W = 500 Hz
0
10
20
30
40
0
20
40
60
80
100
120
140
160
180
200 khz


0
-1
-2
-3
-4
dB
lower
edge
fc
upper
edge
0
20
40
60
80
100
120
140
160
180
200
khz

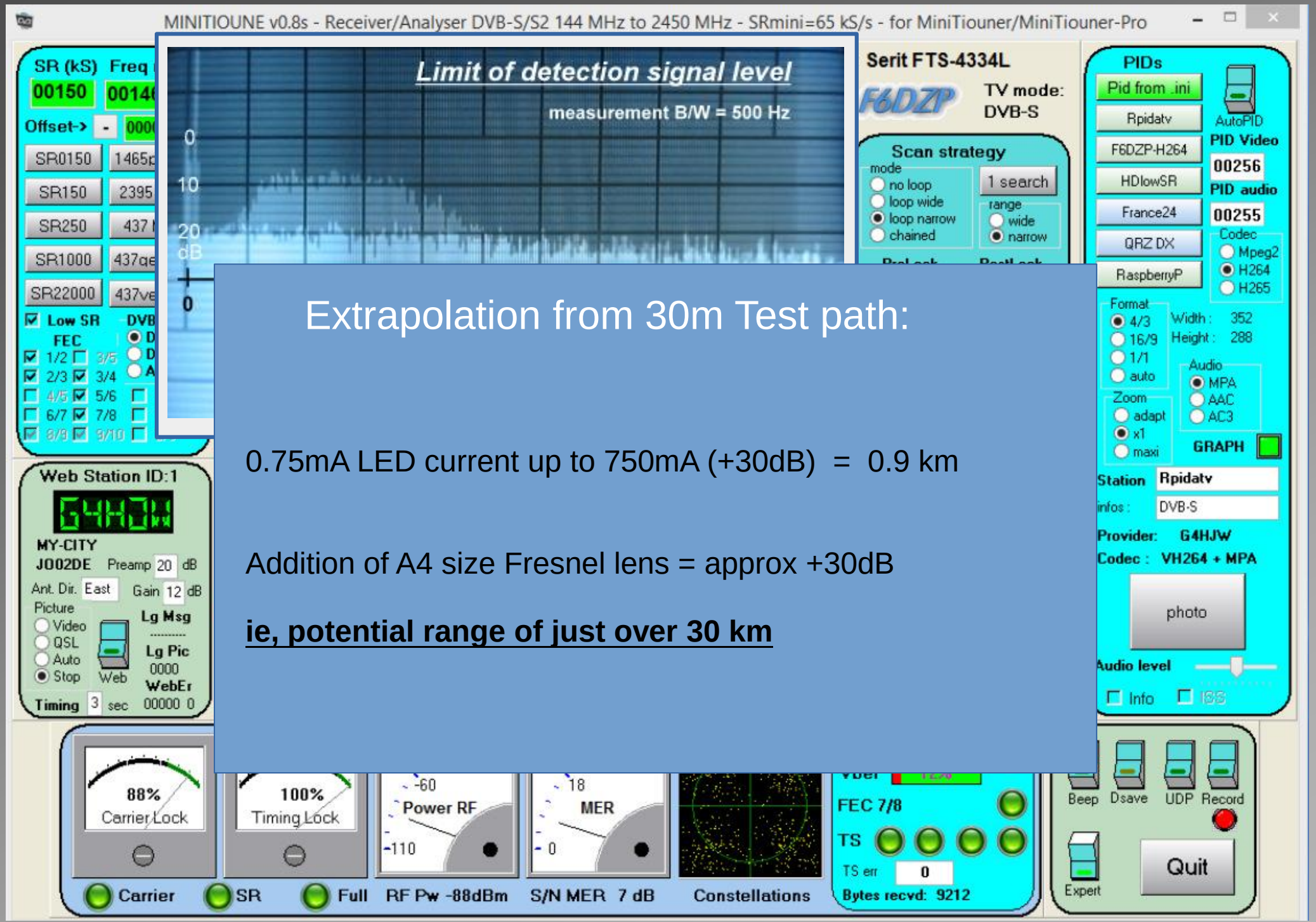
Results across the bench



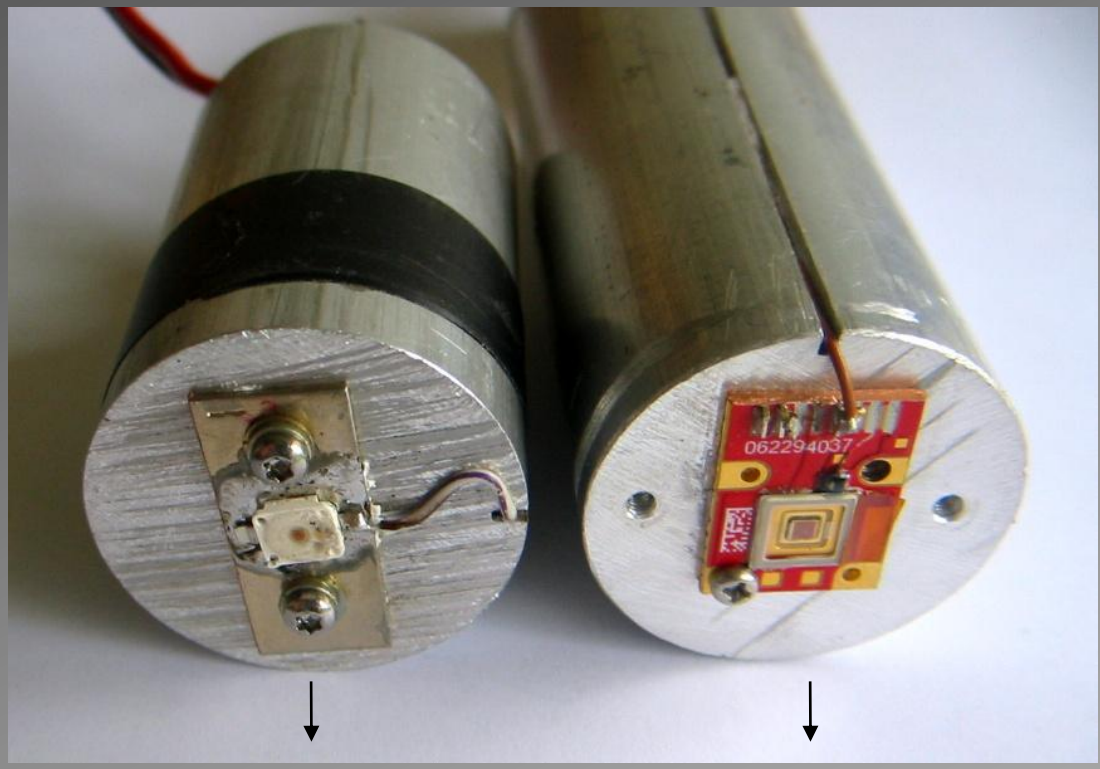
Limit of reliable decode

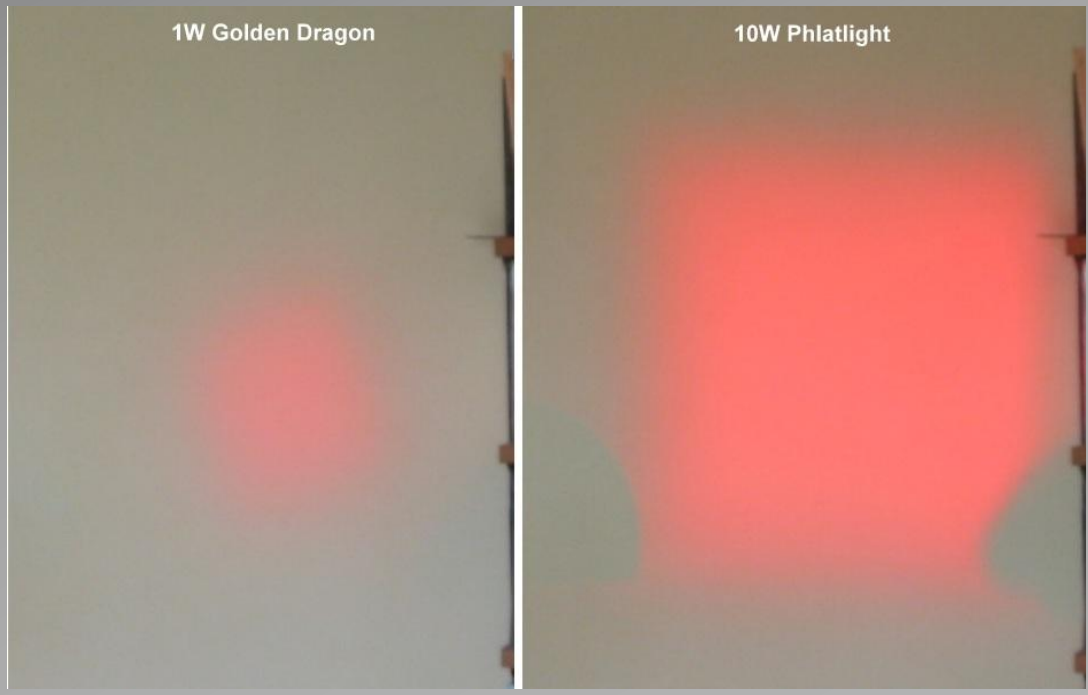


Limit of reliable decode



Effect of larger Die size





End
of
presentation

So where to go
from here?