Sherwood Engineering HF Test Results

Model IC-7300 Mk2 Serial # 12001304 Test Dates: 12/24/2025 – 1/18/2026

IF BW 6000 -6 /-60 Hz	6335 / 10355	Ultimate	>100	dB
IF BW 2400 –6 /-60 Hz	2533 / 3481	Ultimate	>100	dB
IF BW 500 –6 /-60 Hz	515 / 667	Ultimate	>100	dB

Front End Selectivity (A – F) 15 bandpass filters B

Dynamic Range no preamp, IP+ ON

Dynamic Range 20 kHz	87	dB
Dynamic Range 10 kHz	87	dB
Dynamic Range 5 kHz	87	dB
Dynamic Range 2 kHz	87	dB

Dynamic Range preamp #1, IP+ ON

Dynamic Range 20 kHz	83	dB
Dynamic Range 10 kHz	83	dB
Dynamic Range 5 kHz	83	dB
Dynamic Range 2 kHz	83	dB

Blocking or ADC overload above noise floor
1uV signal @ 100 kHz, AGC On, OVF 122 dB

Reciprocal Mixing Dynamic Range (RMDR)

Spacing kHz		
2.5	112	dB
5	115	dB
10	117	dB
15	118	dB
20	119	dB
50	120	dB
100	121	dB
200	122	dB
300	122	dB
400	122	dB
500	122	dB

Phase noise (normalized) at 2.5 kHz spacing:	-139	dBc/Hz
Phase noise (normalized) at 5 kHz spacing:	-142	dBc/Hz
Phase noise (normalized) at 10 kHz spacing:	-144	dBc/Hz
Phase noise (normalized) at 15 kHz spacing:	-145	dBc/Hz
Phase noise (normalized) at 20 kHz spacing:	-146	dBc/Hz
Phase noise (normalized) at 50 kHz spacing:	-147	dBc/Hz

Phase noise (normalized) at 100 kHz spacing:	-148	dBc/Hz	
Phase noise (normalized) at 200 kHz spacing:	-149	dBc/Hz	
Phase noise (normalized) at 300 kHz spacing:	-149	dBc/Hz	
Phase noise (normalized) at 400 kHz spacing:	-149	dBc/Hz	
Phase noise (normalized) at 500 kHz spacing:	-149	dBc/Hz	

Noise floor, SSB bandwidth 14 MHz, no preamp		-126	dBm
Noise floor, SSB bandwidth 14 MHz, Preamp 1 On		-134	dBm
Noise floor, SSB bandwidth 14 MHz, Preamp 2 On		-136	dBm
Sensitivity SSB at 14 MHz, no preamp		0.35	uV
Sensitivity SSB at 14 MHz, no preamp, IP+ ON		0.42	uV
Sensitivity SSB at 14 MHz, Preamp 1 On		0.13	uV
Sensitivity SSB at 14 MHz, Preamp 2 On		0.12	uV
Noise floor, 500 Hz, 14.2 MHz, no preamp		-133	dBm
Noise floor, 500 Hz, 14.2 MHz, no preamp, IP+ ON		-132	dBm
Noise floor, 500 Hz, 14.2 MHz, Preamp 1 On		-141	dBm
Noise floor, 500 Hz, 14.2 MHz, Preamp 2 On		-142	dBm
Noise floor, SSB, 50.125 MHz, no preamp		-125	dBm
Noise floor, SSB, 50.125 MHz, Preamp 1		-133	dBm
Noise floor, SSB, 50.125 MHz, Preamp 2		-134	dBm
Sensitivity, SSB, 50.125 MHz, no preamp		0.39	uV
Sensitivity, SSB, 50.125 MHz, Preamp 1		0.14	uV
Sensitivity, SSB, 50.125 MHz, Preamp 2		0.125	uV
Noise floor, 500 Hz, 50.125 MHz, no preamp		-130	dBm
Noise floor, 500 Hz, 50.125 MHz, Preamp 1 On		-138	dBm
Noise floor, 500 Hz, 50.125 MHz, Preamp 2 On		-139	dBm
Signal for S9, no preamp	-73 dBm	50	uV
Signal for S9, Preamp 1	-81 dBm	22	uV
Signal for S9, Preamp 2	-85 dBm	12	uV
Gain of preamps within hysteresis limits of the S meter			
Preamp 1		8	dB
Preamp 2		13	dB
Attenuator		19	dB
AGC threshold at -3 dB, no preamp		2.5	uV
AGC threshold at -3 dB, Preamp 1 ON		0.9	uV
AGC threshold at -3 dB, Preamp 2 ON		0.52	uV

Notes:

S units are 3 dB
S meter tracking above S9 is quite accurate at 10 dB/division.

IP+ increases audio noise 4 dB, but only degrades CW noise floor 1 dB.

The spectrum display no longer diminishes brightness on the edges like the original 7300.

Reference gain set to +7 for best display on a Hy-gain 204BA in Denver, CO.

With no antenna and the reference set to +20, there is 10 dB less waterfall noise compared to the 7300 (S/N 02012272)

Transmit IMD

2-tone test on 20 meters.

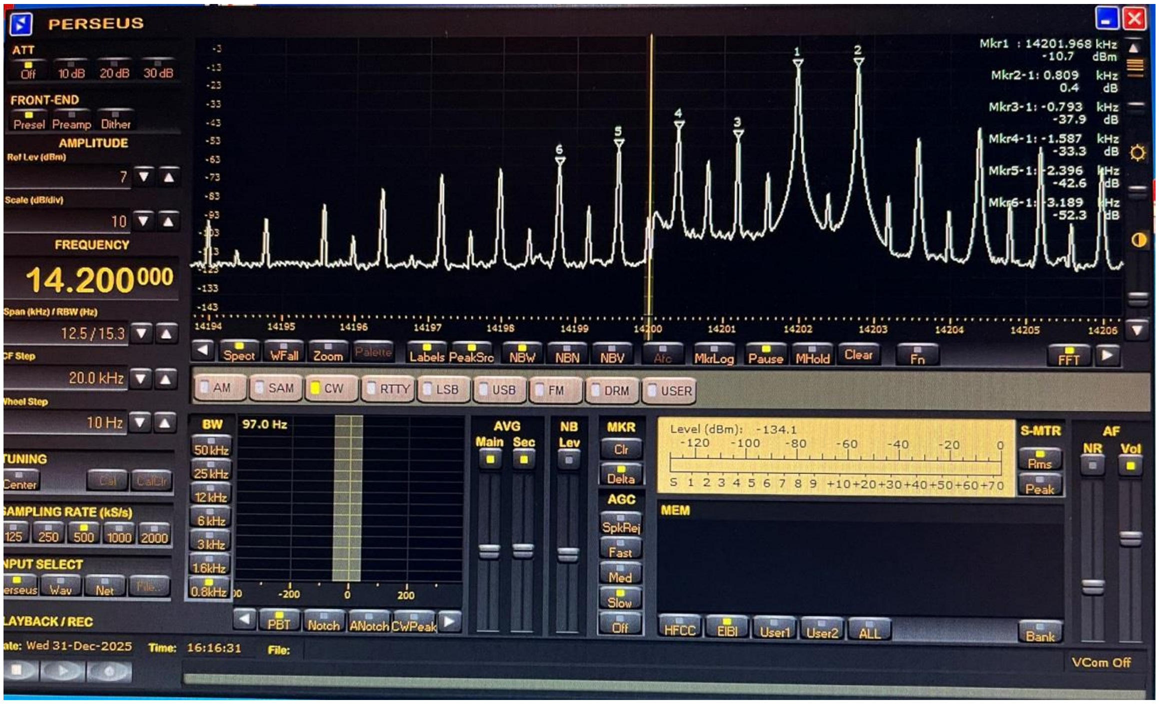
Note: the 3rd order at 100 watts was lower than the 5th order on 160m – 15m.

Output set to 100%, Mic gain 86%, Drake W4 wattmeter reading 35 watts

Full power	Half power
3rd order -38 dBc	-27 dBc
5th order -33 dBc	-39 dBc
7th order -42 dBc	-49 dBc
9th order -52 dBc	-59 dBc

Note: At full power (100 watts PEP) the 3rd order IMD product is significantly lower than the 5th order which is not a true indication of lower IMD splatter. At 50 watts PEP a monotonic fall-off of odd-order products is much more indicative of transmit splatter.

Spectrum analyzer TX IMD screen capture 20m



Note: The distortion spikes in-between the odd-order products are artifacts of the transformers in the 2-tone combining setup. This does not affect the odd order data.

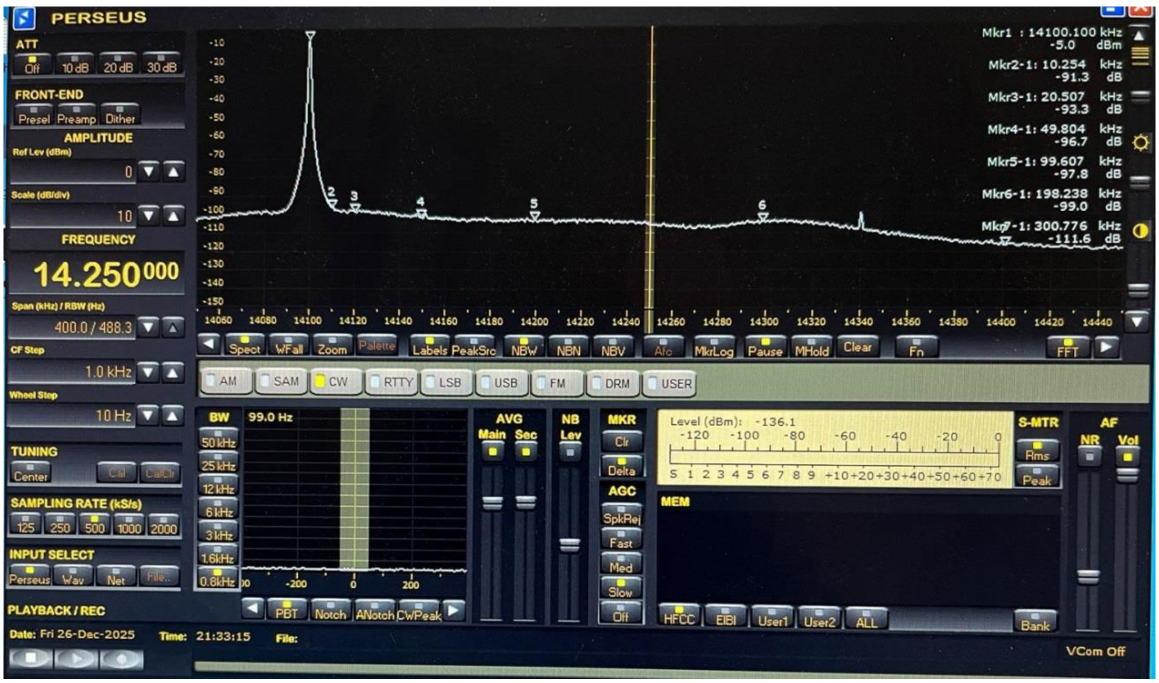
Transmit Composite Noise (CN) IC-7300Mk2 and original IC-7300 (Mk1)

Note: The original 7300 is also listed for comparison.

14.10 MHz	100 Watts	30 Watts	100 W Mk1	30 W Mk1
Offset	dBc/Hz	dBc/Hz	dBc/Hz	dBc/Hz
+2 kHz	-128	-121		
+5 kHz	-126	-119		
+10 kHz	-123	-117	-121	-110
+20 kHz	-124	-116	-121	-109

+50 kHz	-125	-118		
Offset	dBc/Hz	dBc/Hz	dBc/Hz	dBc/Hz
+100 kHz	-127	-117	-124	-116
+150 kHz	-129	-119		
+200 kHz	-128	-119		

Mk2 TX CN FFT screen capture 100 watts 20m



Icom is advertising a typical 13 dB improvement at 2 kHz in RMDR of the Mk2 over the original 7300. The Sherwood lab measured 12 dB at 2.5 kHz, confirming a significant improvement.

The advertised phase noise improvement on transmit isn’t the correct measurement to make. The upcoming ARRL CSI publication on transmit will be the total noise measurement called Composite Noise. Composite Noise (CN) is the sum of phase noise and amplitude noise. The improvement of the Mk2 over the original 7300 is only a few dB at 100 watts. The amplitude noise in the transmit chain could be in the DAC, the low-level IPA or the PA. It doesn’t really matter to the user where the noise comes from, only that it exists and the amplitude noise (AN) of either version of the 7300 dominates over phase noise (PN).

The one performance area that was a surprise was how the receiver 3rd order dynamic range is different in the Mk2 vs. the original 7300. Two different 7300 (Mk1) samples and one Mk2 sample are compared in the following table.

The newer 7300 originally tested in 02/2018 is in column 1.
The older 7300 originally tested in 04/2016 is in column 2.
The 7300Mk2 data is in column 3.

Dynamic Range, no preamp, IP+ ON	Mk1	Mk1	Mk2	
Dynamic Range 20 kHz	106	103	87	dB
Dynamic Range 10 kHz	100	101	87	dB
Dynamic Range 5 kHz	97	95	87	dB
Dynamic Range 2 kHz	97	94	87	dB

As a metrology accuracy double check the following testing was done:
The newer 7300 from 2018 was retested in 12/2025 with identical results.
The Mk2 was retested at my alternate laboratory with identical results.

Both Mk1 7300s have a constant dynamic range vs. test spacing with IP+ OFF.
The Mk1 7300 with S/N 02001408 constant dynamic range was 81 dB IP+ OFF.
The Mk1 7300 with S/N 02012272 constant dynamic range was 84 dB IP+ OFF.
Now the Mk2 has a constant dynamic range vs. test spacing with IP+ ON.

There appears to be an undocumented hardware changes in the 7300Mk2 that are now more similar to the IC-705 than the original IC-7300.

Note: The dynamic range data on the IC-7300Mk2 is now similar to the IC-705.

Dynamic Range 20 kHz	89	dB
Dynamic Range 10 kHz	89	dB
Dynamic Range 5 kHz	89	dB
Dynamic Range 2 kHz	88	dB

Three Icom transceivers have an RF Tail hot-switching issue when driving a linear amplifier. A hot switch occurs when there is an amp key line state change while the rig's RF output is present. This occurs when operating CW in full break-in, or while still talking when releasing the PTT on SSB. These hot-switching transceivers are the original IC-7300, the IC-705 and the IC-9700.

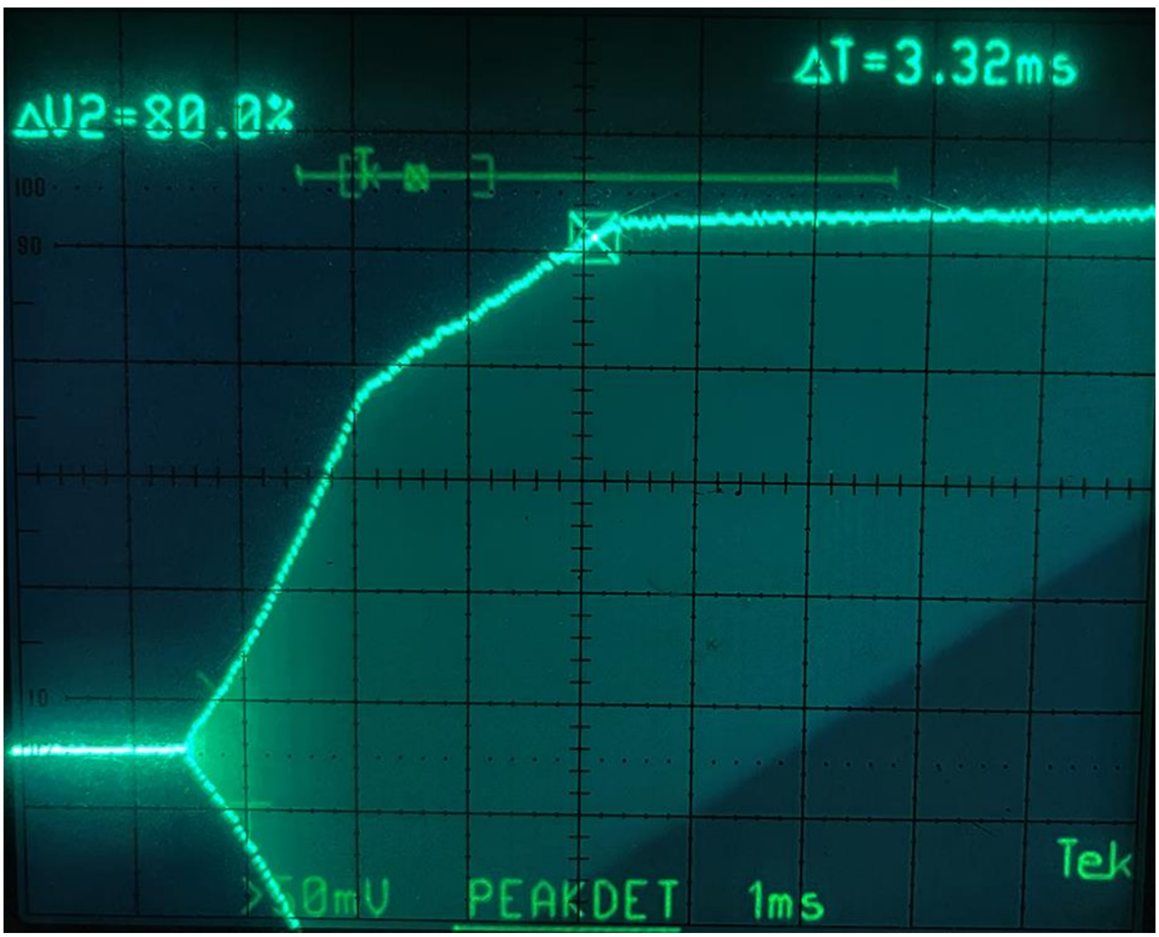
Note: While there is a "key down" RF delay adjustment in the 7300 menu, there is no menu setting to fix the "key up" RF key line timing problem.

This hot-switch issue of the 7300 existed from 2016 until the end of production that included over 100,000 units.
The 7300Mk2 no longer hot switches in any mode which is a significant design improvement.

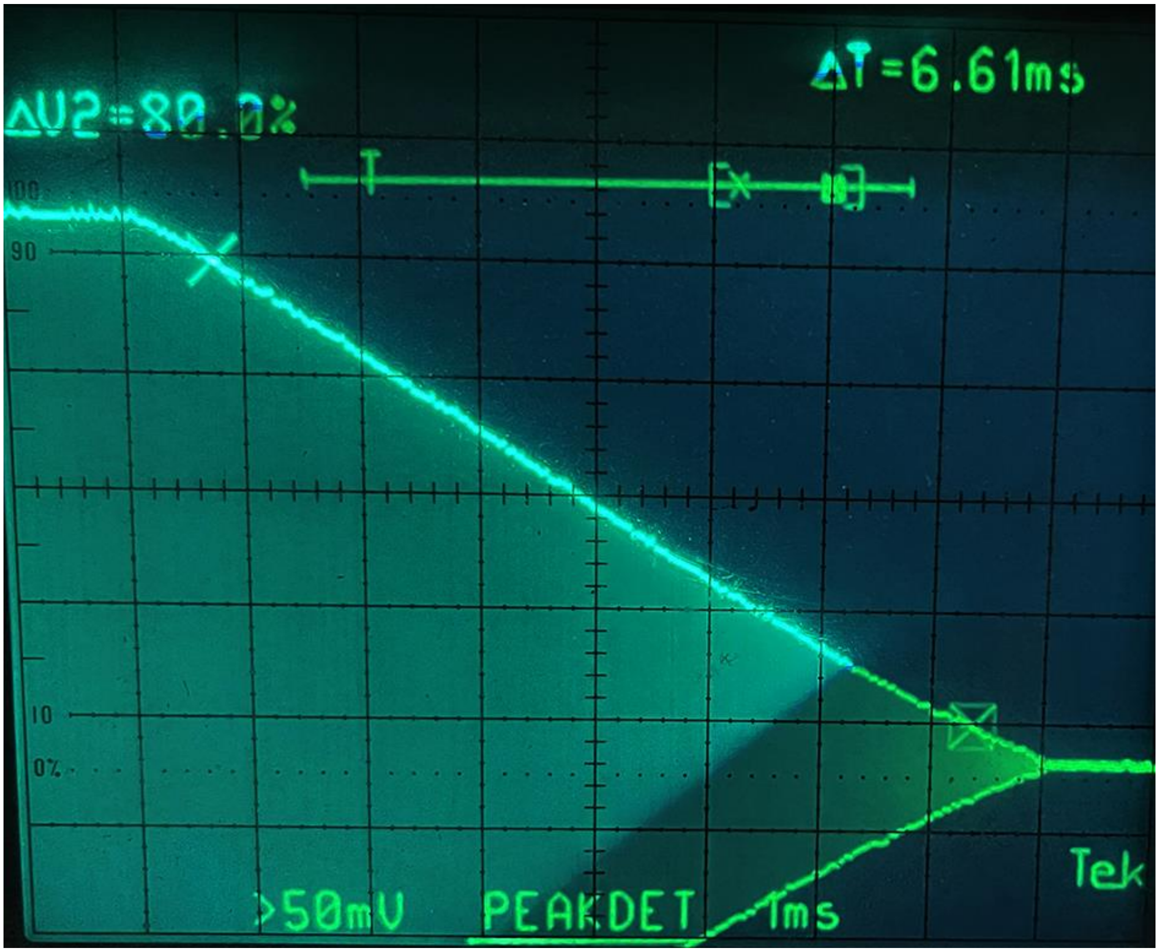
The real-time-clock battery failure problem does not appear to have changed significantly. There is however an added Ethernet port with NTP (network time protocol) capability as a clock-setting solution. Note: As with USB ports, an Ethernet port is susceptible to lightning-induced EMP damage. Only the IC-7760 has a CR2032 clock battery in a socket.

Mk2 feature improvements:
HDMI port for an external display
Two SMA RX-antenna ports for a BPF, a preamp or a receive-only antenna
Internal CW decoder
USB Type-C dual virtual COM ports
Audio peak filter (APF) for improved CW reception

CW waveform screen shots and comments



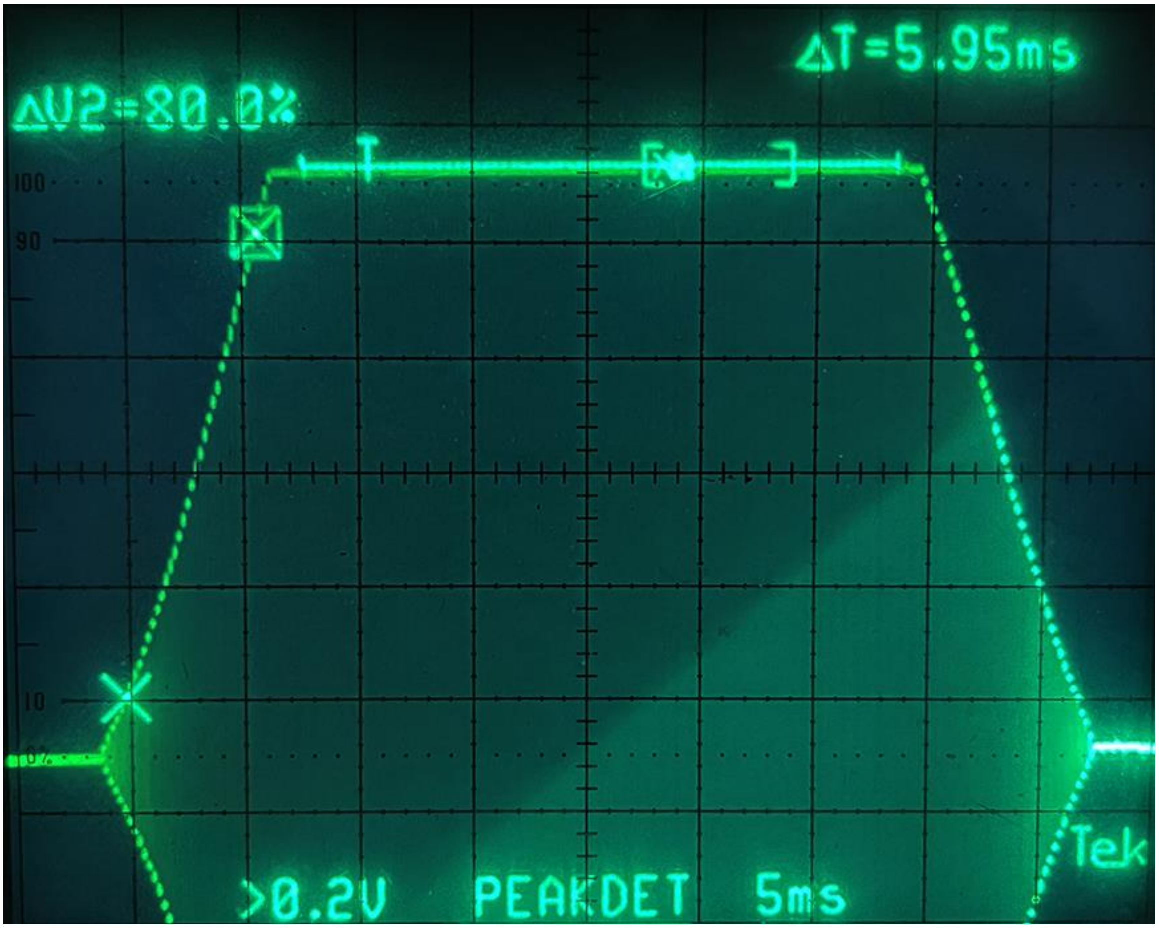
Rise time set for 8ms. First dit discontinuity caused by the ALC and is power level dependent. Stepwise waveform shape not ideal.



Fall time set to 8ms. The abrupt beginning of transition fall time not ideal.

The following rise and fall time screen captures are for the 2nd dit where the ALC effects are minimized or non-existent.

No difference was observed between semi and full-break-in as far as CW wave shape.

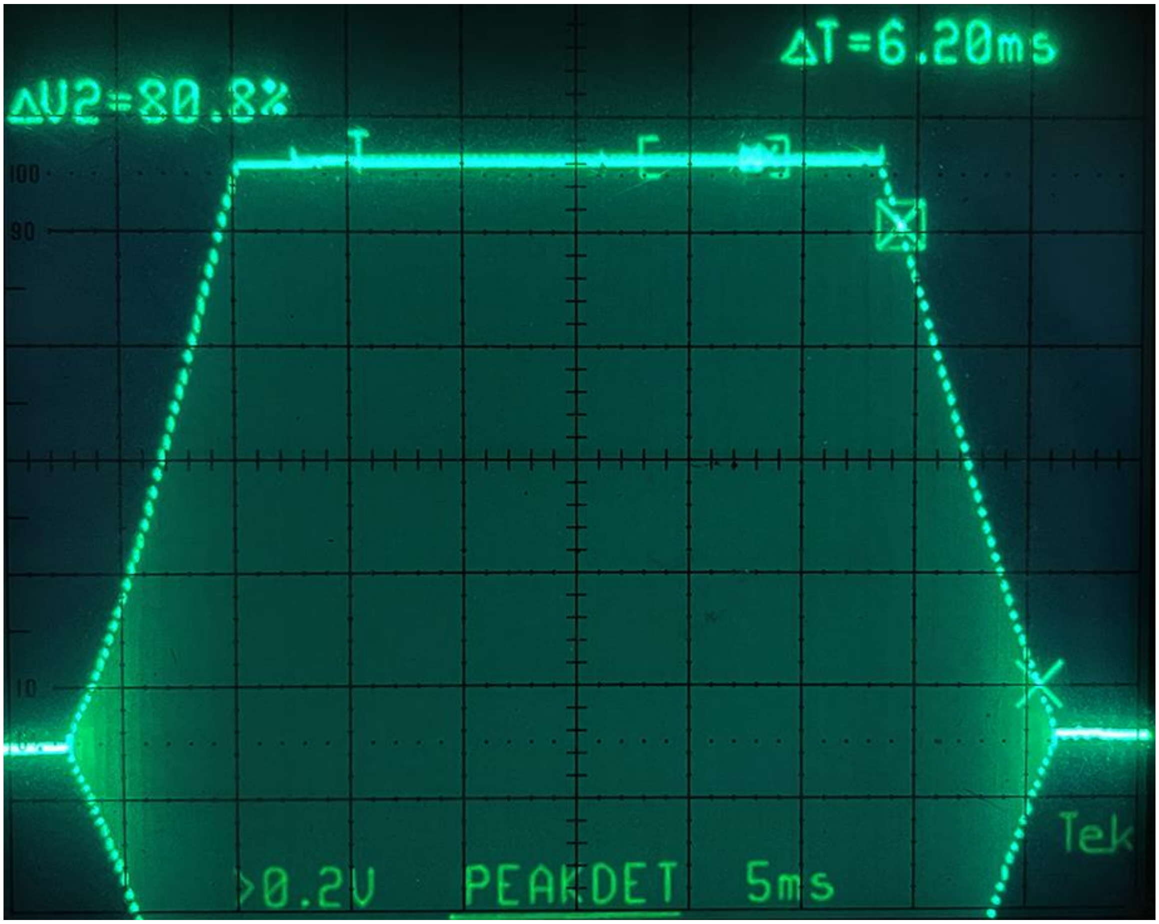


Rise time 8ms, 50 watts, second dit

The second dit 10%/90% rise and fall times are closer to the menu values unlike at 2 or the default 4ms menu settings which are much faster than nominal.

From a key click bandwidth standpoint, the wave shape would be better if there were smoother transitions at the edges of the waveform. The beginning of the dit, the top of the envelope, the envelope as it begins to fall and the end of the dit should be a smooth curve.

With modern digital radios, an ideal CW waveform should be able to be programmed in firmware.



Fall time 8ms, 50 watts, second dit

Overshoot observations:

Overshoot varies with the menu rise time setting. A 3% overshoot exists at the 2ms setting, 1% at 4m, and no overshoot at 6 or 8ms. The first dit is always truncated with far too fast a rise time causing key clicks.

I strongly suggest using the 8ms option for a cleaner signal.

A visual inspection reports the 14-bit ADC is now a TI rather than LTC.

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