



GE MDS
175 Science Parkway
Rochester, NY, 14620
November 28th, 2012

To: MICOM Labs
440 Boulder Court, Suite 200
Pleasanton, CA 94566

Atten: Gordon Hurst, & Bill Graff

Subject: MDS Transceiver, "MDS4310" Radio Emission Designator Update, (Class 2 Permissive Change)
FCC ID: E5M5LL2314

Gentlemen,

The initial FCC testing and grant were issued in May 1993. The emission designator for the MDS4310 FCC grant was initially calculated in error for a 12.5KHz channel. The FCC grant lists 16K0F1D, F2D, F3D as the designators, the radio operates on 12.5KHz channels, and meets the spectral efficiency of "9600bps for a 12.5KHz channel" per the "FCC's VHF/UHF Narrowbanding" requirement.

Many of these old MDS4310 radios are still in operation with customers using them for various SCADA applications. Having this improper emission designator on the MDS4310 FCC grant is causing customer and frequency coordination issues as the FCC's "Narrowband Mandate" quickly approaches.

GE MDS is requesting MICOM's TCB to file a C2PC to this old FCC grant, to change the emission designator from 16K0F1D to the proper value of 8K2F1D, F2D, F3D. Thus proving to our customers that the MDS4310 is FCC Narrowband Compliant.

GE MDS's legacy radio, the "MDS4310" has a MTBF of over 25yrs. This radio is still in use in the field and we often get radios back for "service or replacement". This radio is not capable of being tuned in the field to meet the 12.5KHz BW requirement. The units will be returned to GE and will be remanufactured to the narrowband rules. Our newer narrowband compliant radio the SD4 is being recommended to replace the 4310 as customers require higher data rates and throughput.

Justification for emission designator

There's rule-of-thumb for FM transmitters that the necessary bandwidth equals twice the deviation plus twice the highest modulating frequency.

That rule of thumb is one of methods suggested for determining necessary bandwidth in FCC rule part 2.202.

For example on analog FM voice transmitters, the audio goes up to 3 kHz and the deviation is 2.5 kHz; that works out to an 11 kHz necessary bandwidth.

Modems designed into all GE-MDS products produce a smooth processed and filtered waveform with a limited bandwidth and fixed deviation.

The 9600 bps modem in nearly all of our narrowband products including the MDS1000, MDS2310 and MDS4310, MDS9710 and MDS4710, SD4 and SD9, all work the same way:

The modulating audio rolls-off, following a duobinary frequency response.

At DC the response is full. At 2400 Hz it is 3 dB down. At 4800 Hz it's in a null. Nothing exists above 4800 Hz.

So technically the highest modulating frequency is just under 4800 Hz, but the deviation at that frequency is nil.

The peak deviation is 3.1 kHz for 150 and 450 MHz transmitters and 3.7 kHz on 950 MHz radios.

But peak deviation never occurs at the peak modulating frequency, so the rule-of-thumb does not apply.

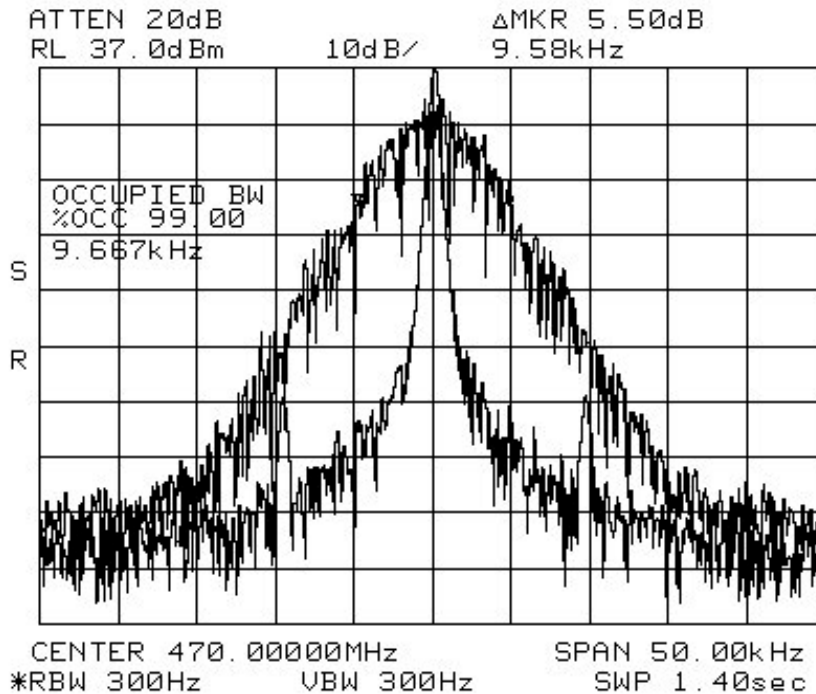
We mistakenly applied the rule of thumb we get $2 * 3.1 + 2 * 4.8 = 15.8$ kHz, which apparently is where 16K0 came from currently listed on the FCC grant.

FCC rules 2.202 (c)(4) also say that necessary bandwidth can be determined by measurement for cases not covered by the formulas

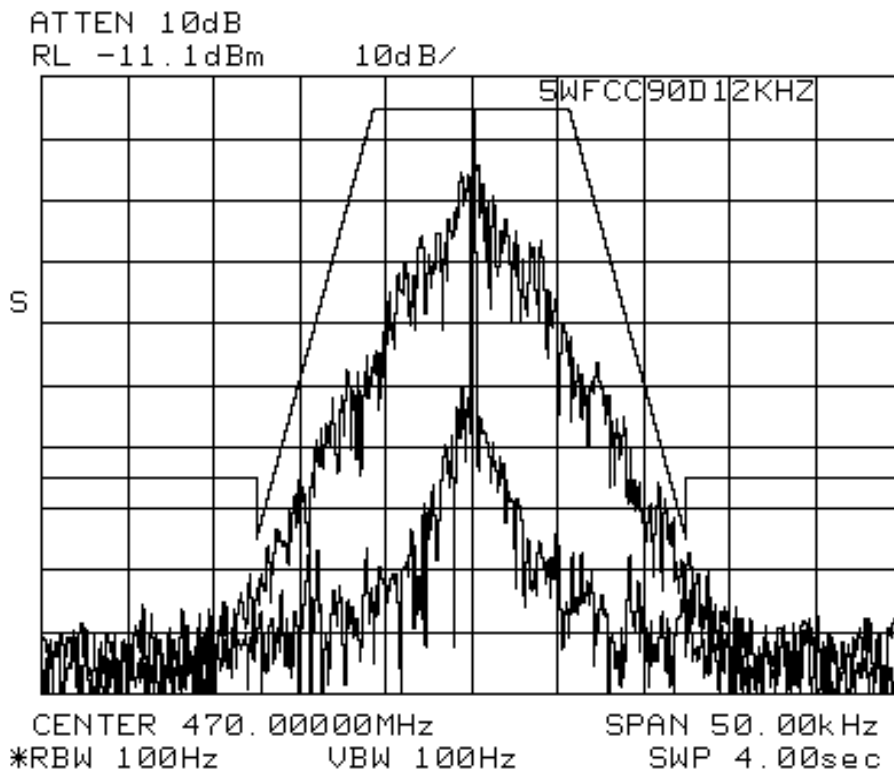
We should have used the measured value for necessary bandwidth instead of using a formula that didn't apply.

The following test data was taken in the GEMDS engineering lab on "calibrated test equipment". This test data should prove adequate justification to update the FCC grant to reflect the emission designator to 9K6F1D, F2D, F3D

99% Occupied Bandwidth, RBW300Hz



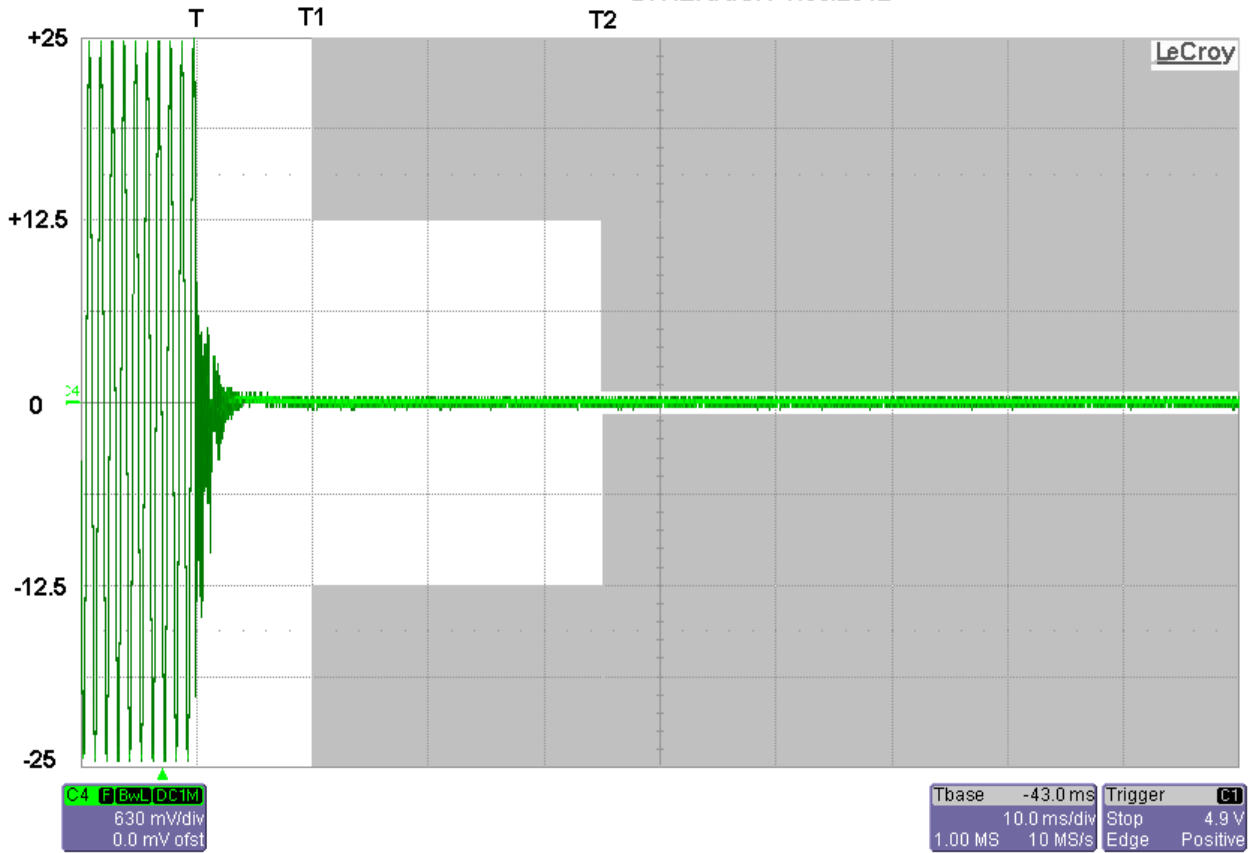
TX Mask part 90D 12.5KHz channel



Transient Keying

4310 TRANSIENT TEST - KEY

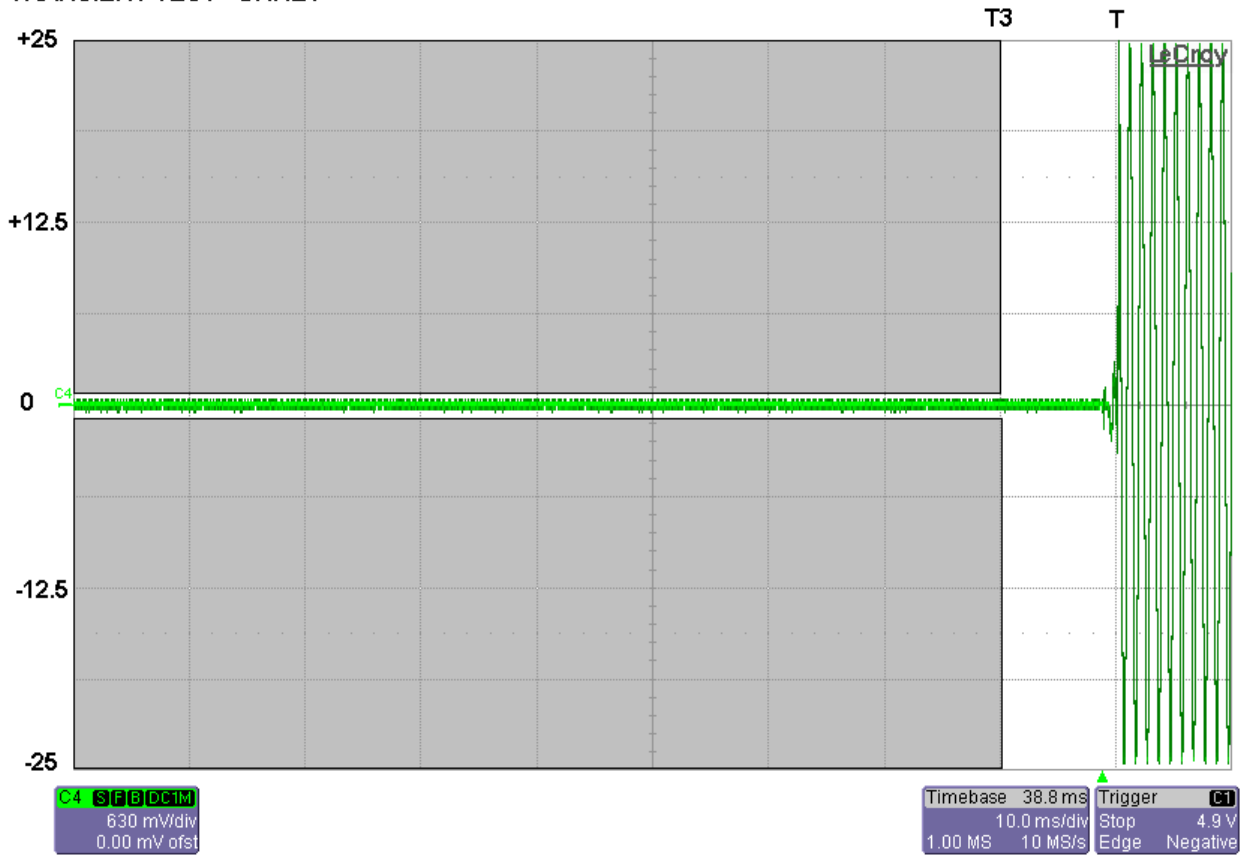
D. HERRICK 7/30/2012



Transient de-Keying

4310 TRANSIENT TEST - UNKEY

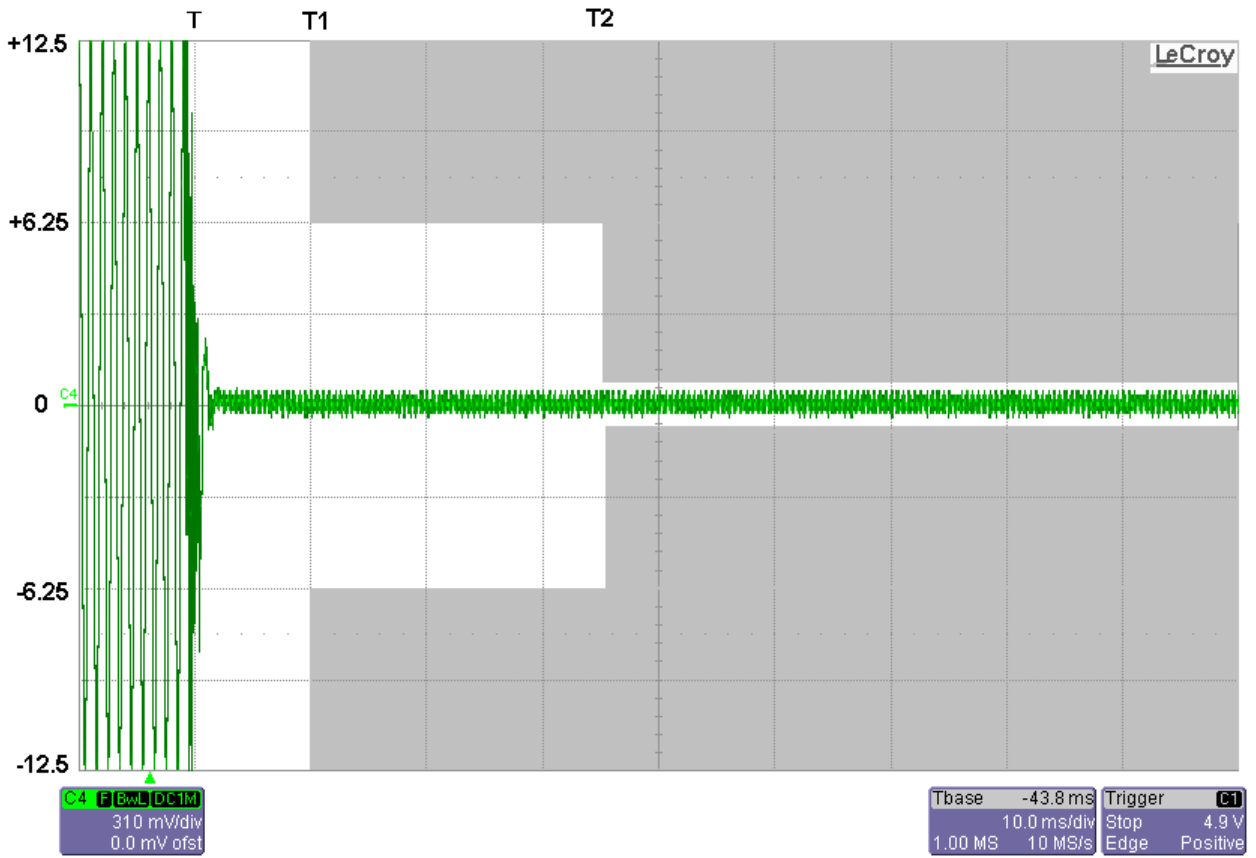
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Transient Keying

4310 TRANSIENT TEST - KEY 12.5 KHz

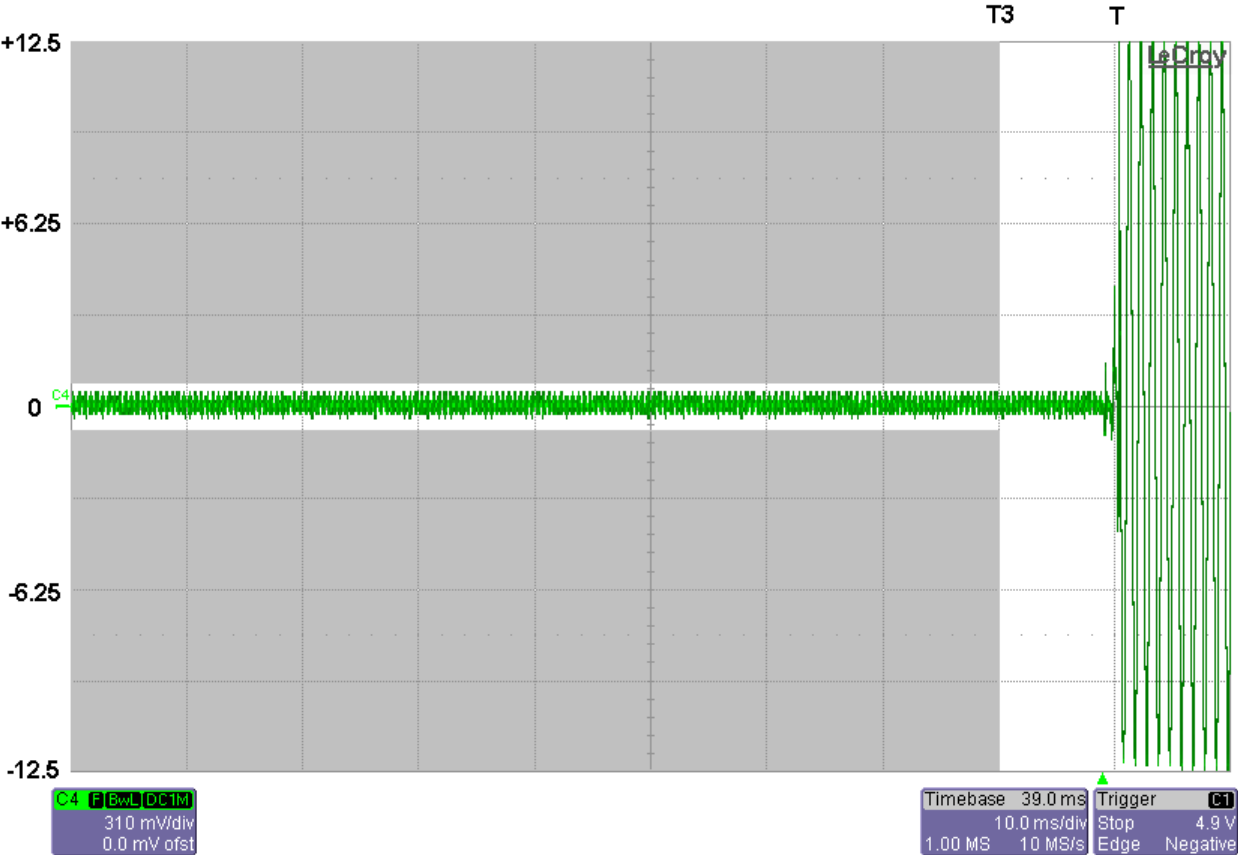
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Transient de-Keying

4310 TRANSIENT TEST - UNKEY 12.5 KHz

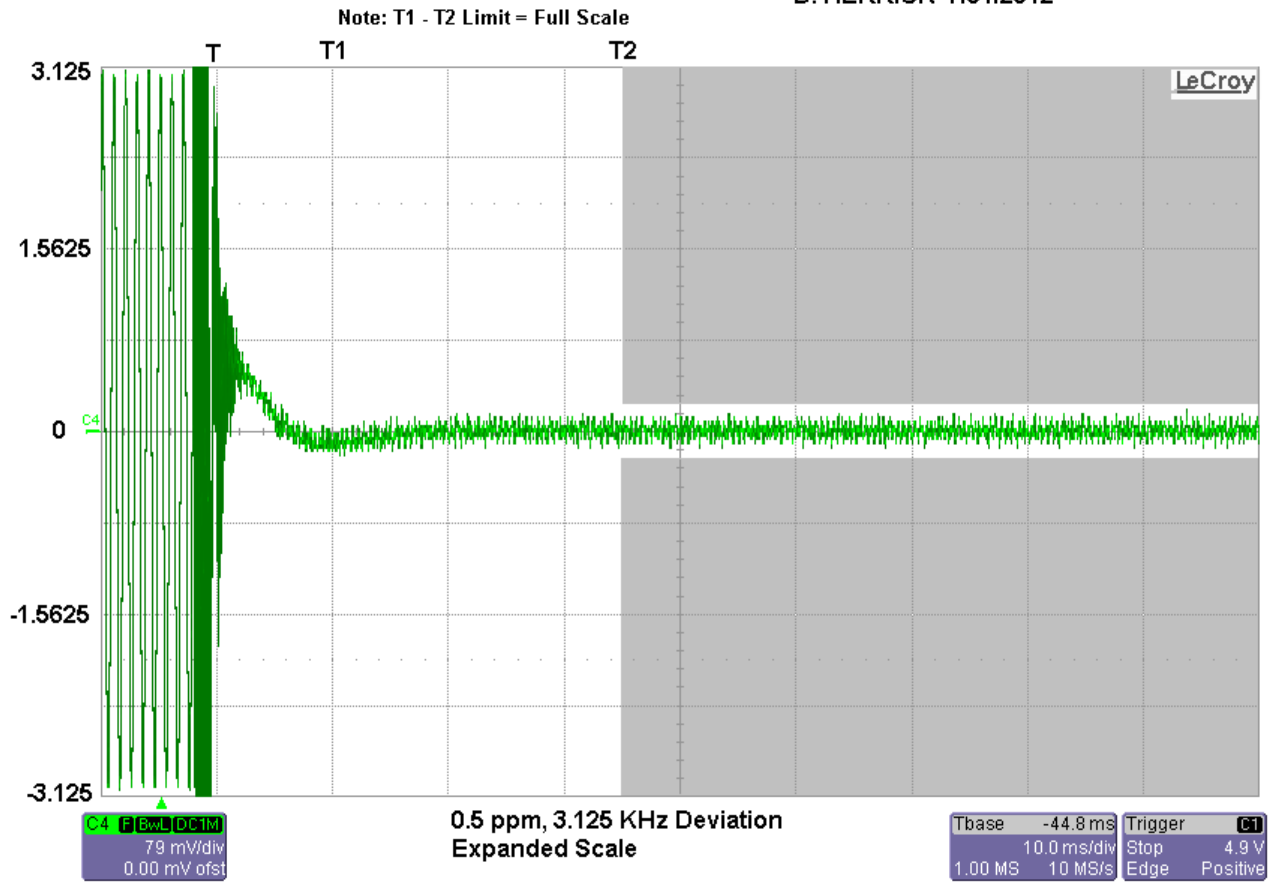
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Transient Keying

4310 TRANSIENT TEST - KEY 6.25 KHz EXPANDED SCALE

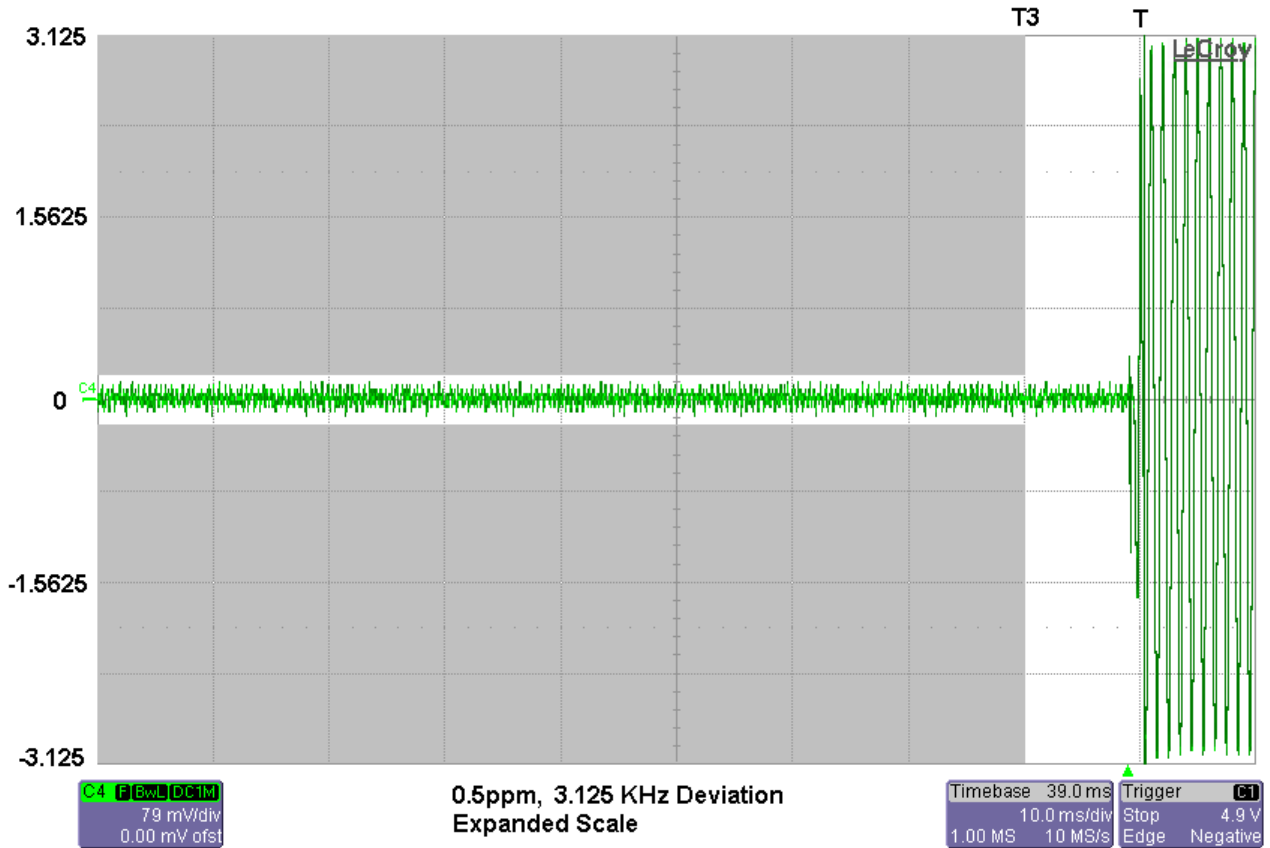
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Transient de-Keying


4310 TRANSIENT TEST - UNKEY 6.25 KHz EXPANDED SCALE

D. HERRICK 7/31/2012



We hope the above information is supporting evidence to allow your TCB to file a Class 2 permissive and change the emission designator on the MDS4310 to prove FCC narrowband Compliance.

Respectfully

Signed: 

Dennis W McCarthy

Agency Compliance/Safety Engineer

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