

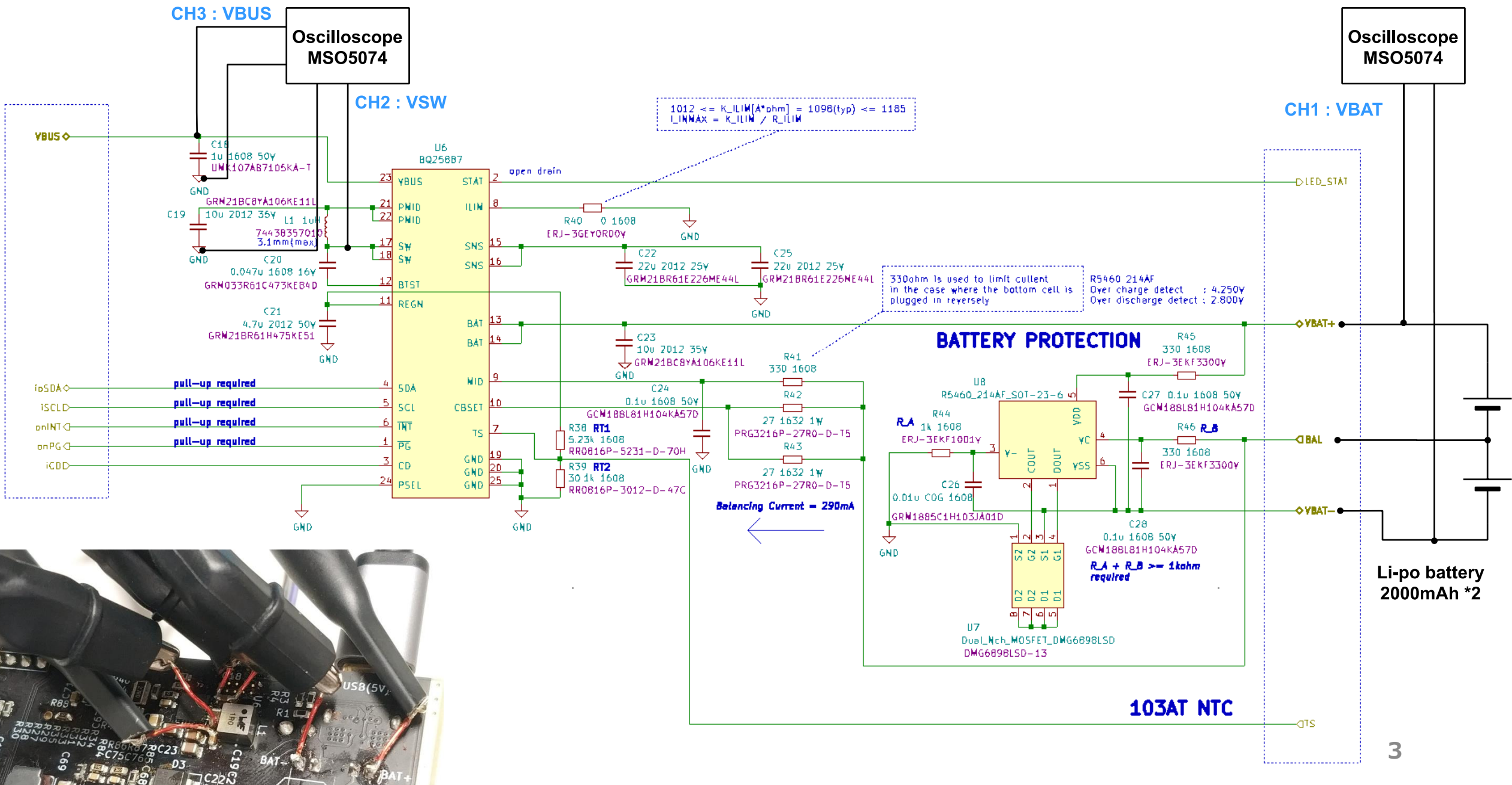
20200727 BQ25887 audible noise issue

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Summary

- ❑ Noise can be heard only when taper charge is used.
- ❑ When the charging current is limited even in a taper charge state it becomes inaudible for the noise.
- ❑ The component that makes the noise is suspected to be the capacitor on the PMID.
 - Replacing the capacitors with another one of the same capacity (2012M to 1608M) or adding them in parallel to increase the capacity does not improve the situation.

Measurement condition



Measurement item

No audible noise state

fig.1A (IBUS = about1.2A, taper charge)

fig.1B (IBUS = about1.2A, taper charge)

fig.1C (IBUS = about1.2A, taper charge)

Audible noise state

fig.2A (IBUS = about0.6A, taper charge)

fig.2B (IBUS = about0.6A, taper charge)

fig.2C (IBUS = about0.6A, taper charge)

fig.3A (IBUS = about0.2A, taper charge)

fig.3B (IBUS = about0.2A, taper charge)

fig.3C (IBUS = about0.2A, taper charge)

fig.3D (IBUS = about0.2A, taper charge)

fig.4A (IBUS = about1.4A, taper charge)

fig.4B (IBUS = about1.4A, taper charge)

fig.4C (IBUS = about1.4A, taper charge)

Common condition

fig.*A : 100ns/div, fig.*B : 1us/div, fig.*C : 1ms/div, fig.*D : 50us/div

CH1 : VBAT, 500mV/div, AC coupling

CH2 : VSW, 5.00V/div, AC coupling

CH2 : VBUS, 500mV/div, AC coupling



bus current meter

BQ25887 register settings

```
//charge current limit enable
//charge current limit = 1000mA
#define REG01_DEF (EN_ILIM|ICHG_800MA|ICHG_200MA)

//Enable VINDPM reset when adapter is plugged in (VINDPM resets to default
//value after Input Source Type Detection)
// #define REG02_DEF (uint8_t)0x00

//bus current limit = 2000mA
//offset = 500mA
//IINDPM >> ICO_ILIM
#define REG03_DEF (EN_ICO|IINDPM_800MA|IINDPM_400MA|IINDPM_200MA|IINDPM_100MA)

//WDT = 40s
//fast charge time = 8h
#define REG05_DEF (EN_TERM|WATCHDOG_0|EN_TIMER|CHG_TIMER_0|TMR2X_EN)

//Enable PSEL detection when VBUS plugs in
//Thermal Regulation Threshold = 60C
//Charge Disable,
//Battery precharge to fast-charge threshold = 3.0V
//Cell Recharge Threshold Offset = 200mV
#define REG06_DEF (AUTO_INDET_EN|CELLLOWV|VCELL_RECHG_1|VCELL_RECHG_0)

//disable PFM
//reset WDT
//top-off timer = 45min
#define REG07_DEF (WD_RST|TOPOFF_TIMER_1|TOPOFF_TIMER_0)

//JEITA High Temp. (45C ÷ 60C) Voltage Setting = 8.0V
//JEITA High Temp. (45C ÷ 60C) Current Setting = 100% of ICHG
//JEITA Low Temp. (0C ÷ 10C) Current Setting = 20% of ICHG
#define REG08_DEF (JEITA_VSET_0|JEITA_ISETH|JEITA_ISETC_0)
```

```
//ILIM = 2000mA
//offset = 500mA
#define REG0A_DEF (ICO_ILIM_800MA|ICO_ILIM_400MA|ICO_ILIM_200MA|ICO_ILIM_100MA)

//NOT mask CHRГ_MASK & ADC_DONE_MASK
#define REG12_DEF (IINDPM_MASK|VINDPM_MASK|TREG_MASK|WD_MASK)

//NOT mask VBUS_MASK
#define REG13_DEF (PG_MASK|TS_MASK|ICO_MASK)

//ADCEN=0, one-shot conv, 15bit
#define REG15_DEF (ADC_RATE)

//enable only VCELL ADC
#define REG16_DEF (IBUS_ADC_DIS|ICHG_ADC_DIS|VBUS_ADC_DIS|VBAT_ADC_DIS|TS_ADC_DIS|TDIE_ADC_DIS)

//all register reset
#define REG25_DEF (REG_RST)

//VDIFF_END_OFFSET = 40mV
//cell balancing interval = 2min
//cell balancing active interval = 32s
//between cell balancing and voltage measurement time = 2s
#define REG28_DEF (VDIFF_END_OFFSET_0|TCB_ACTIVE_0|TSETTLE_1|TSETTLE_0)

//VQUAL_TH = 40mV(pre-qualification start voltage)
//VDIFF_START = 80mV
#define REG29_DEF (VDIFF_START_2)

#define REG2A_DEF (CB_CHG_DIS|CB_AUTO_EN)
```

Others are default settings.

fig.1A waveforms when no audible noise (IBUS = 1.2A, taper charge)

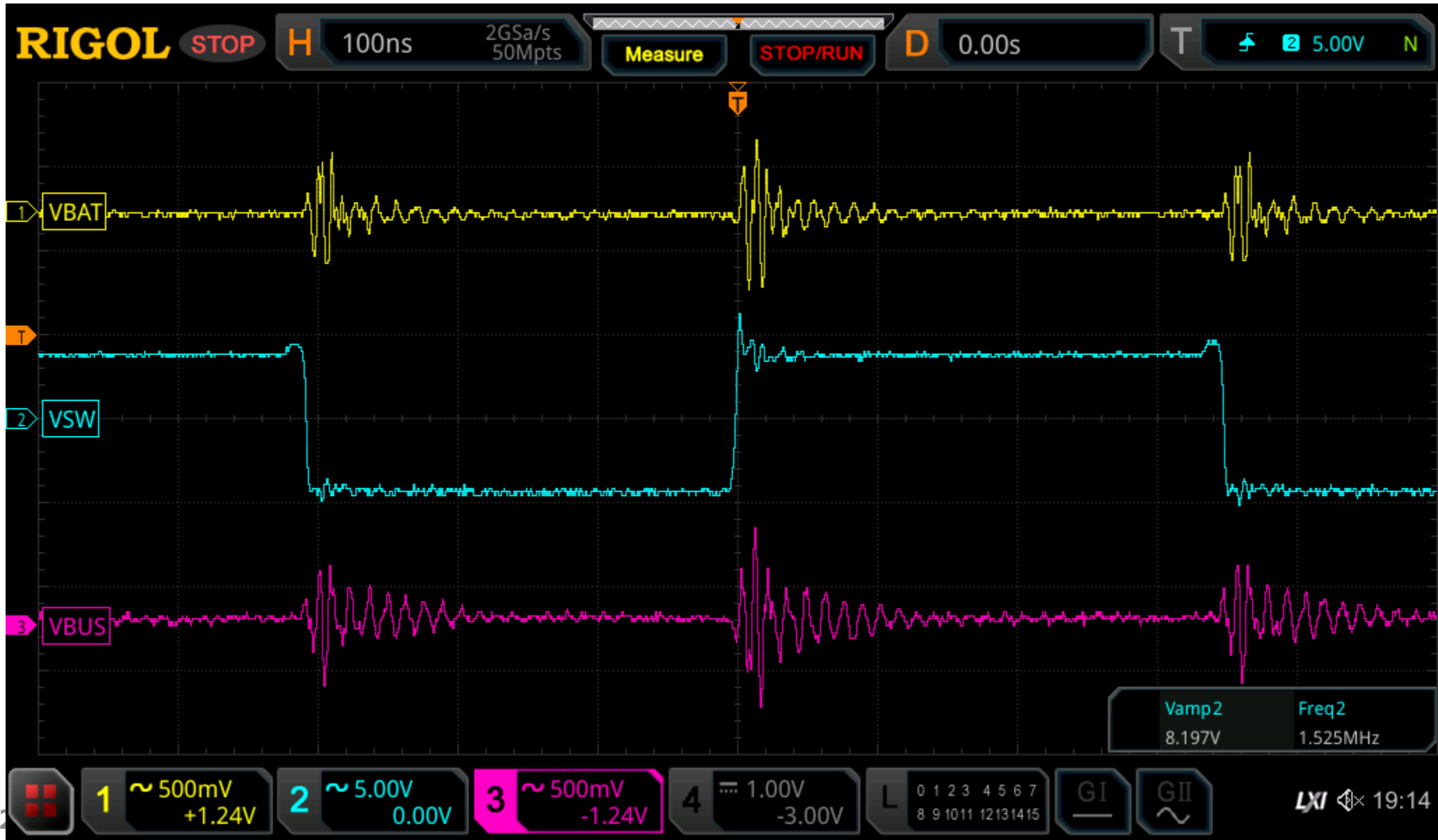


fig.1B waveforms when no audible noise (IBUS = 1.2A, taper charge)

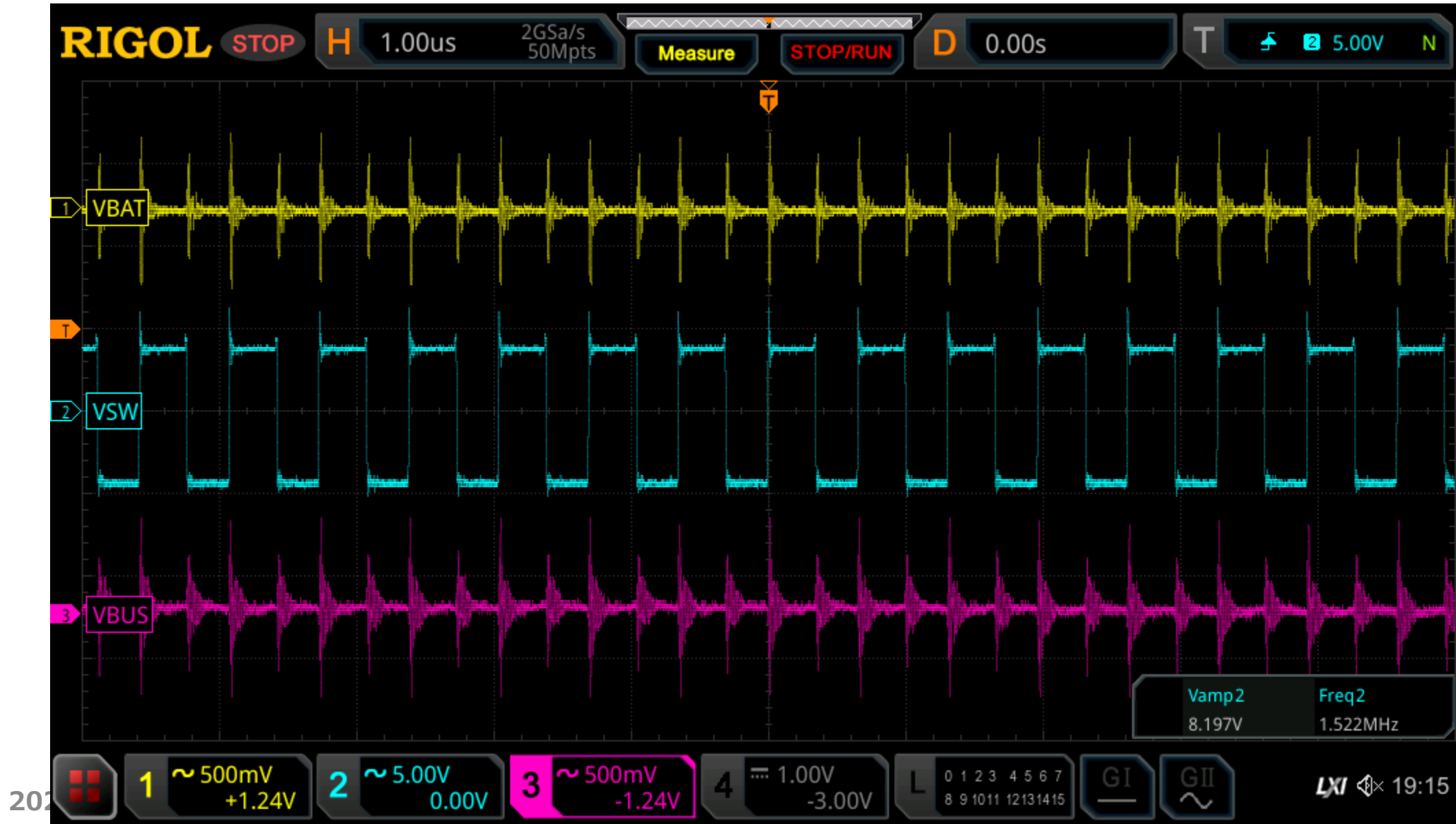


fig.1C waveforms when no audible noise (IBUS = 1.2A, taper charge)

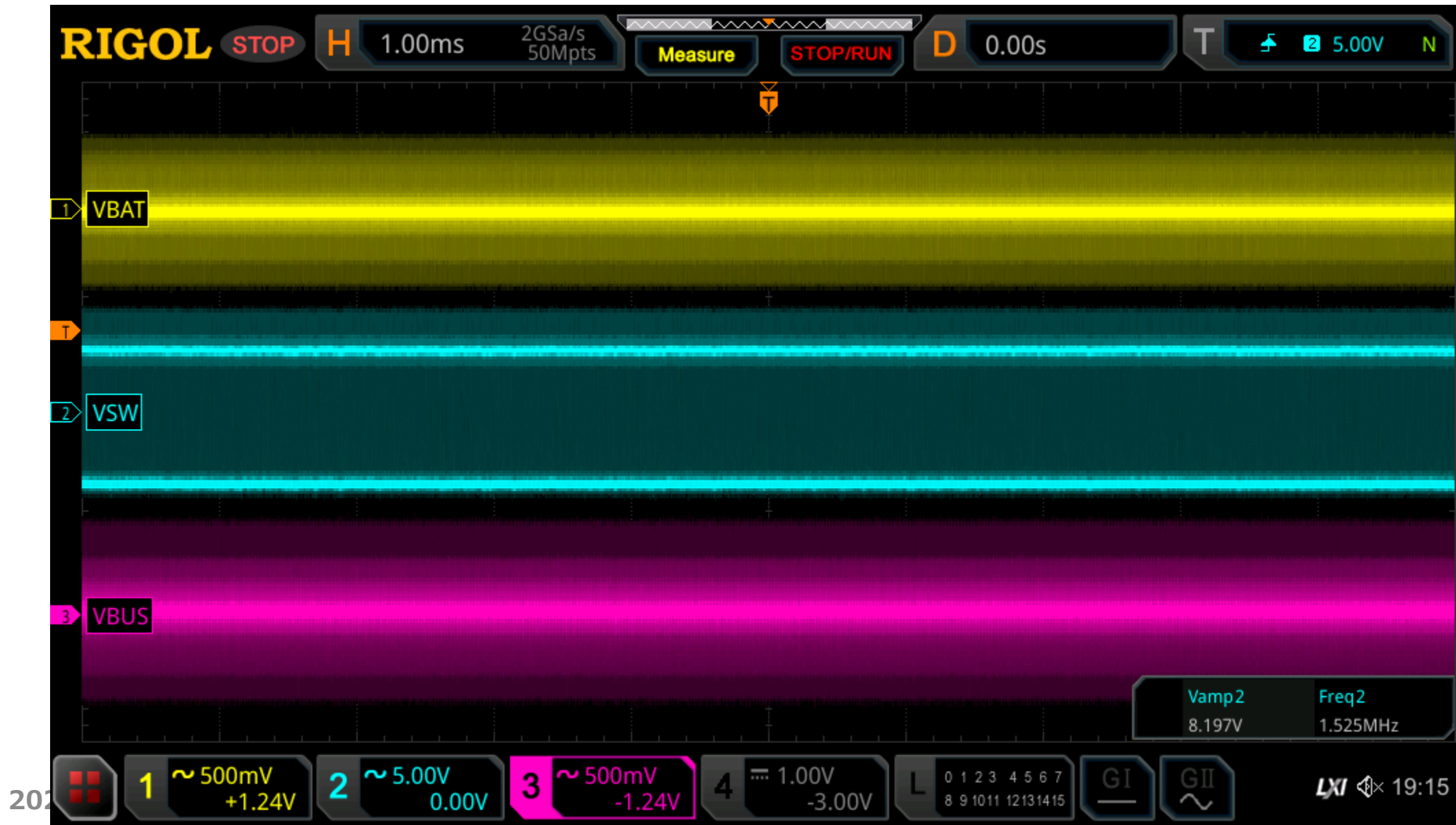


fig.2A waveforms when **audible noise** (IBUS = 0.6A)

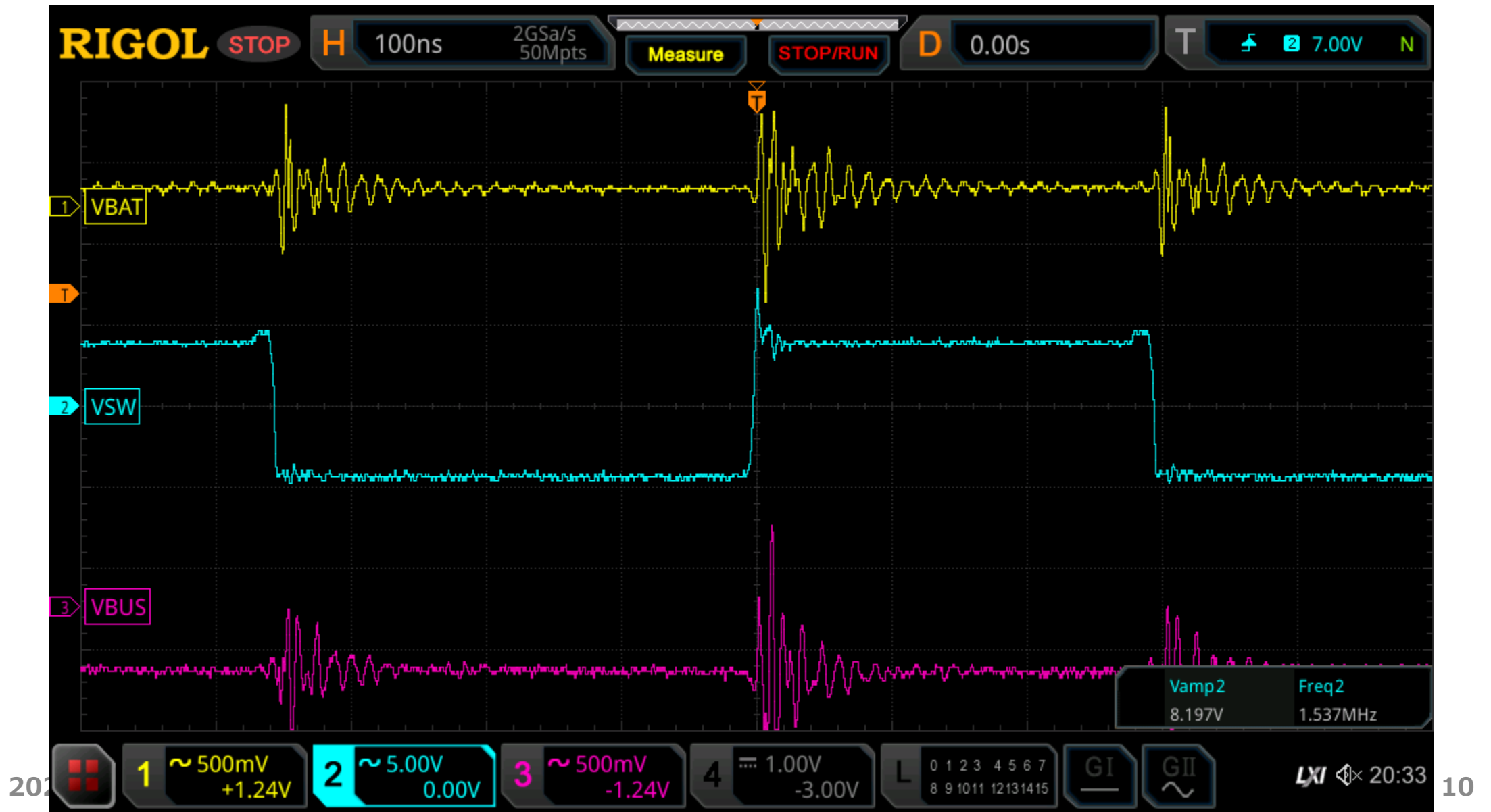


fig.2B waveforms when **audible noise** (IBUS = 0.6A)

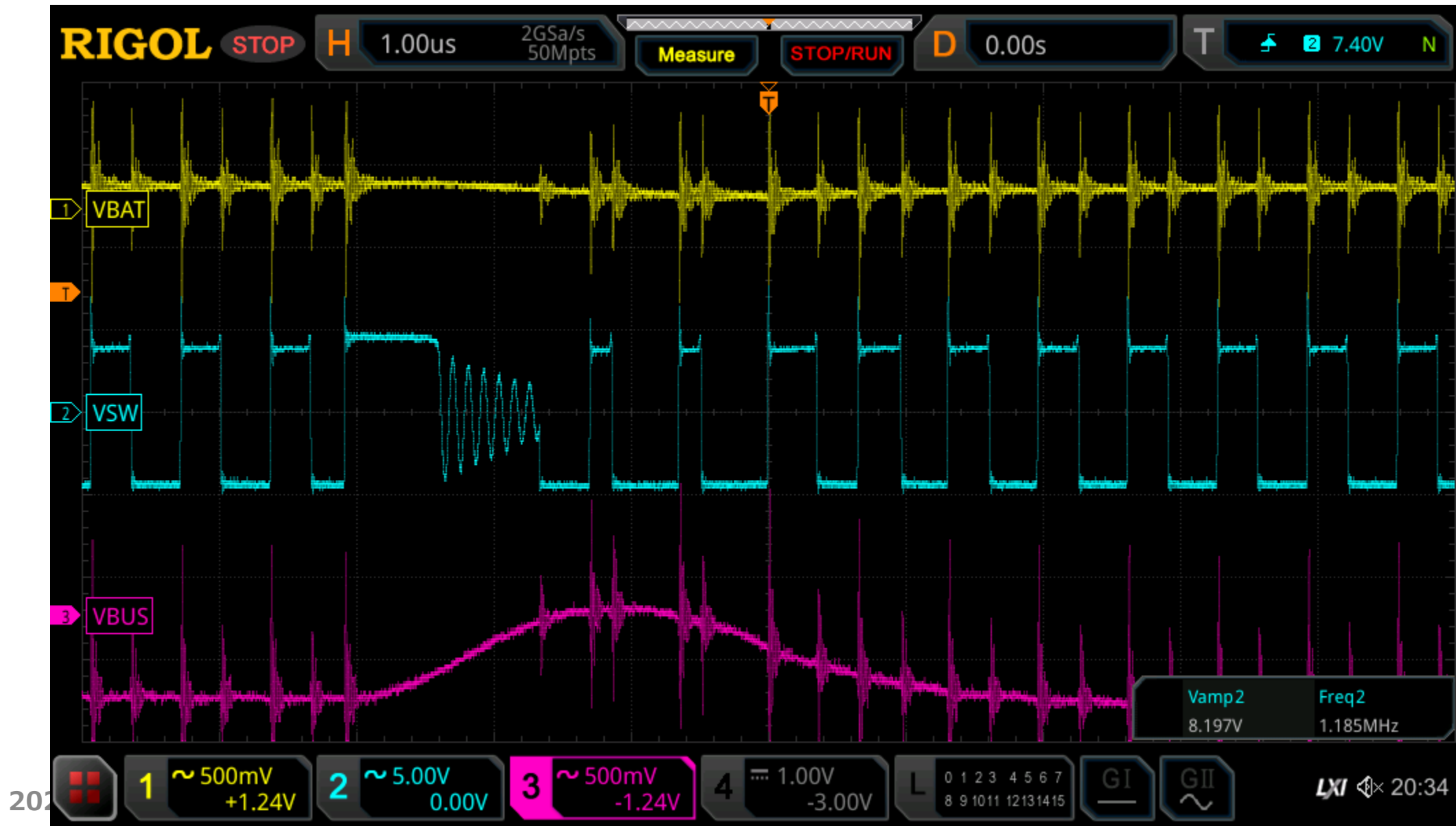


fig.2C waveforms when **audible noise** (IBUS = 0.6A)

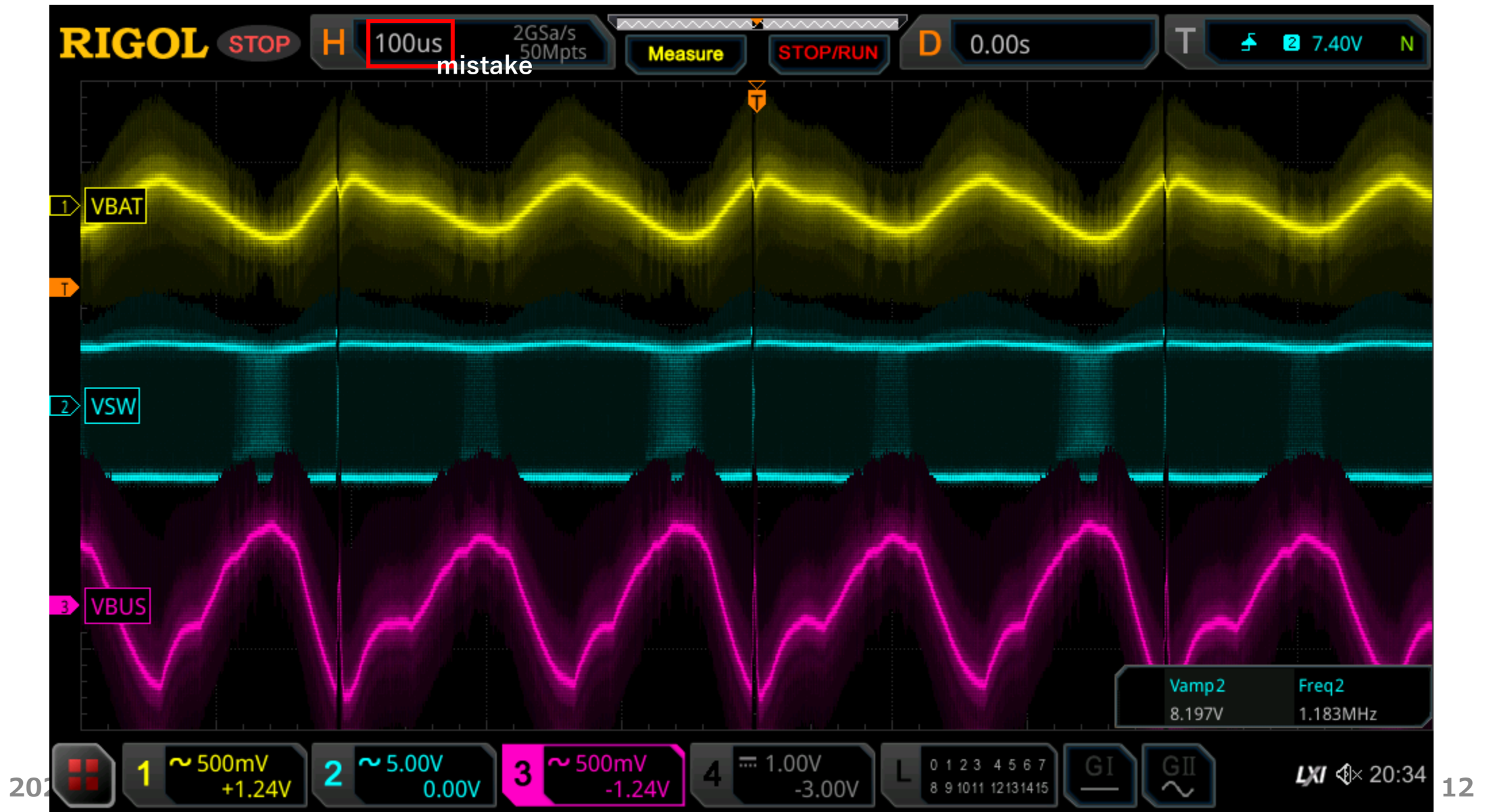


fig.3A waveforms when **audible noise** (IBUS = 0.2A)

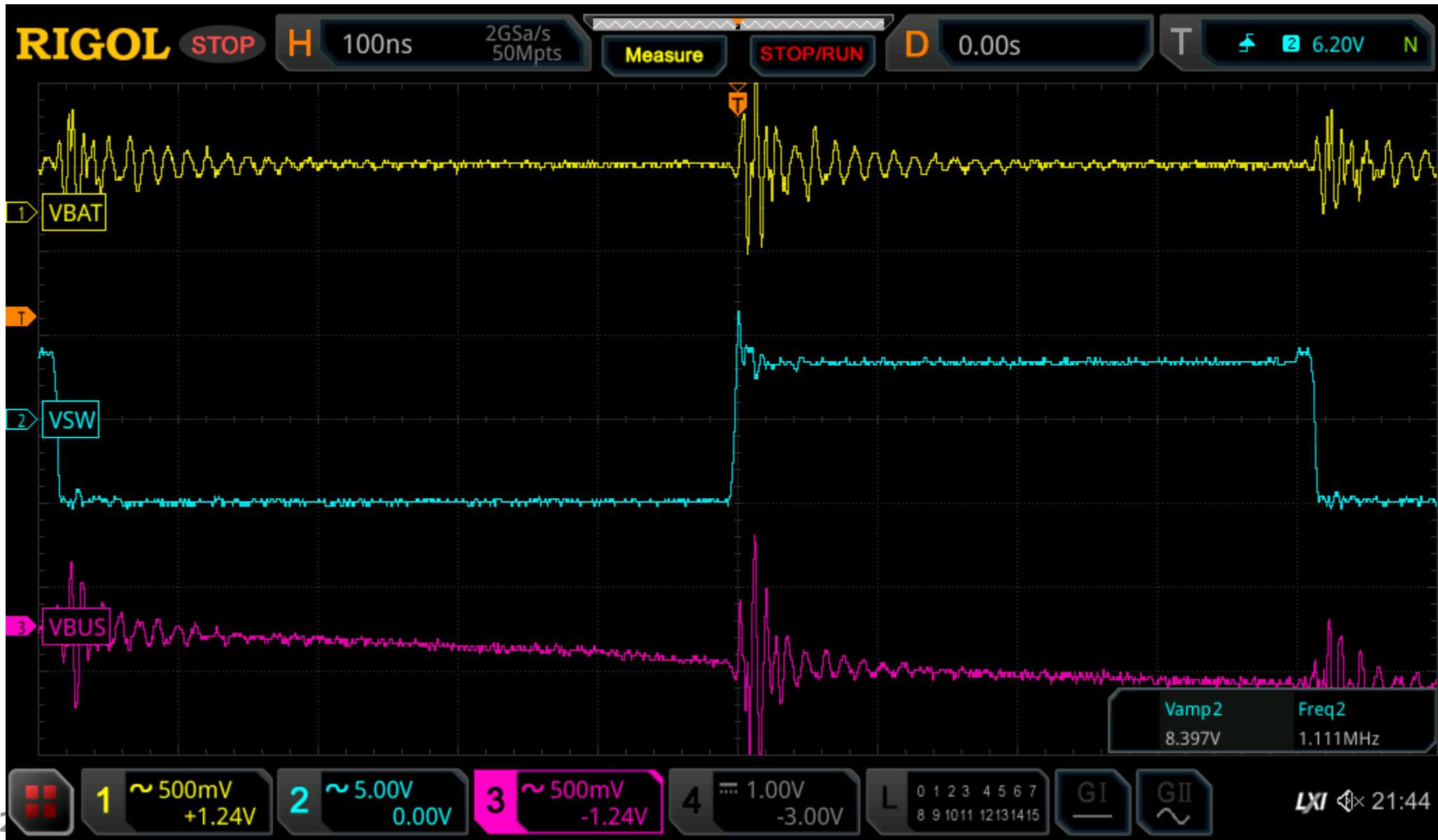


fig.3B waveforms when **audible noise** (IBUS = 0.2A)

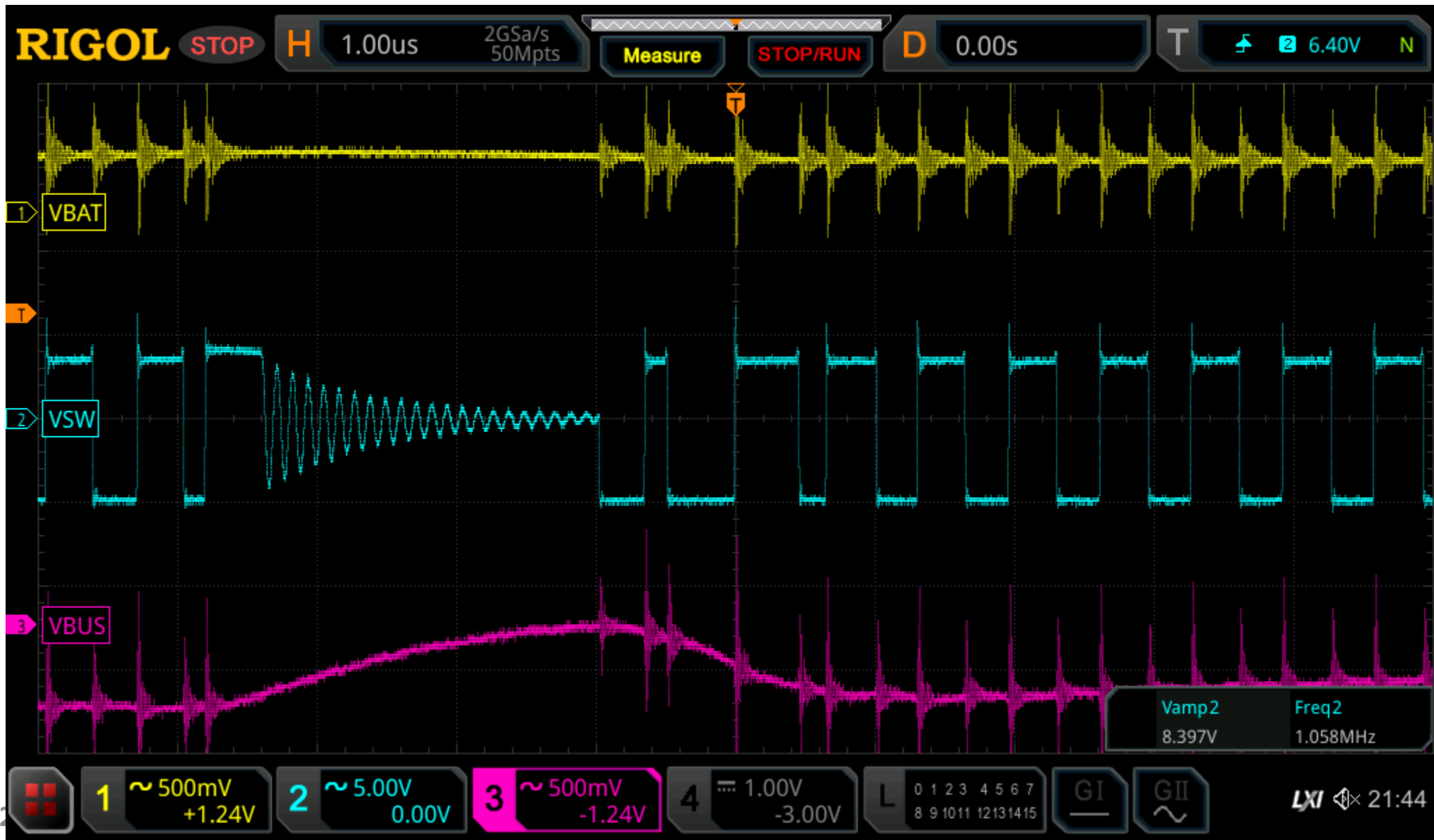


fig.3C waveforms when **audible noise** (IBUS = 0.2A)

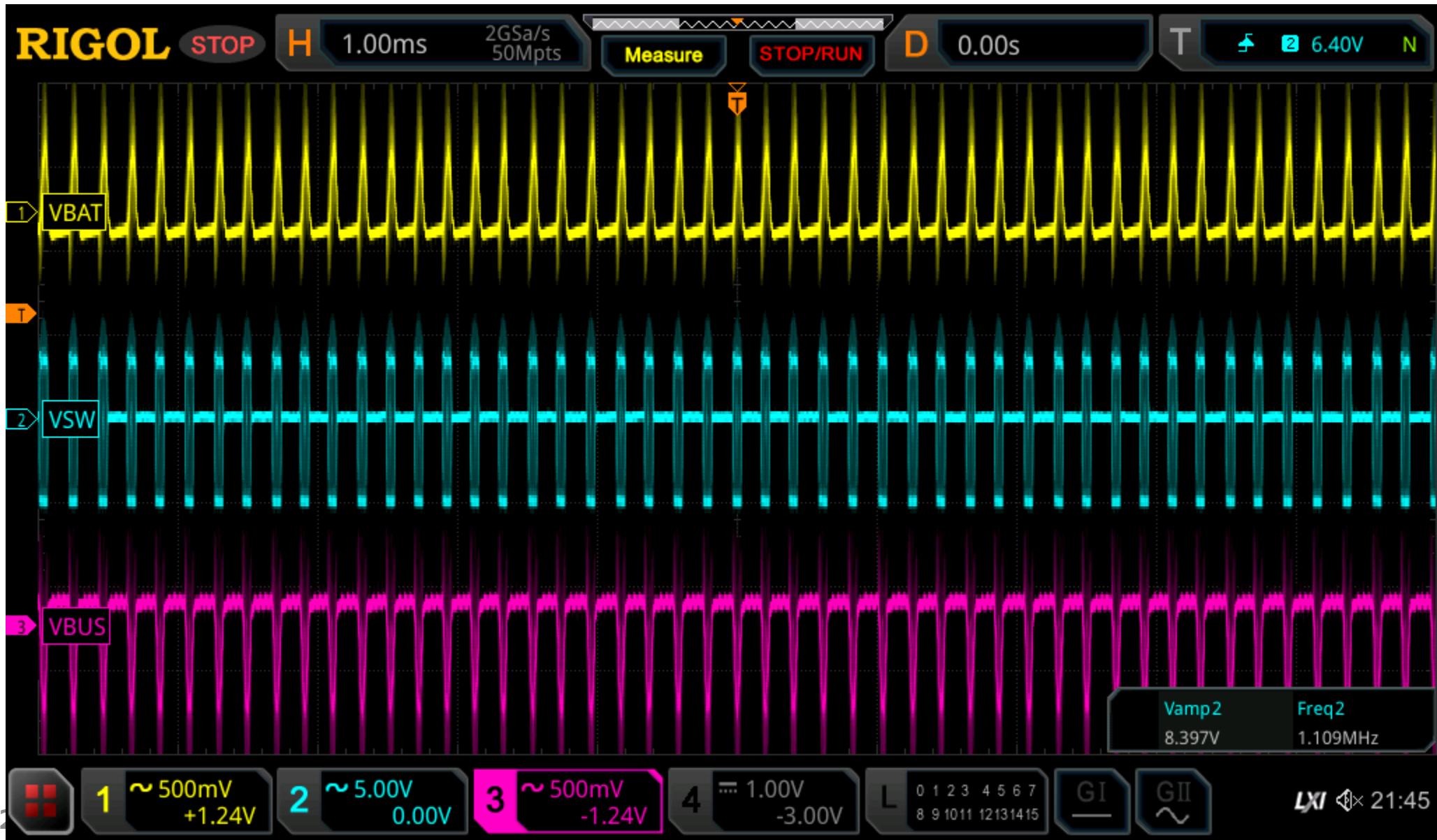


fig.3D waveforms when **audible noise** (IBUS = 0.2A)

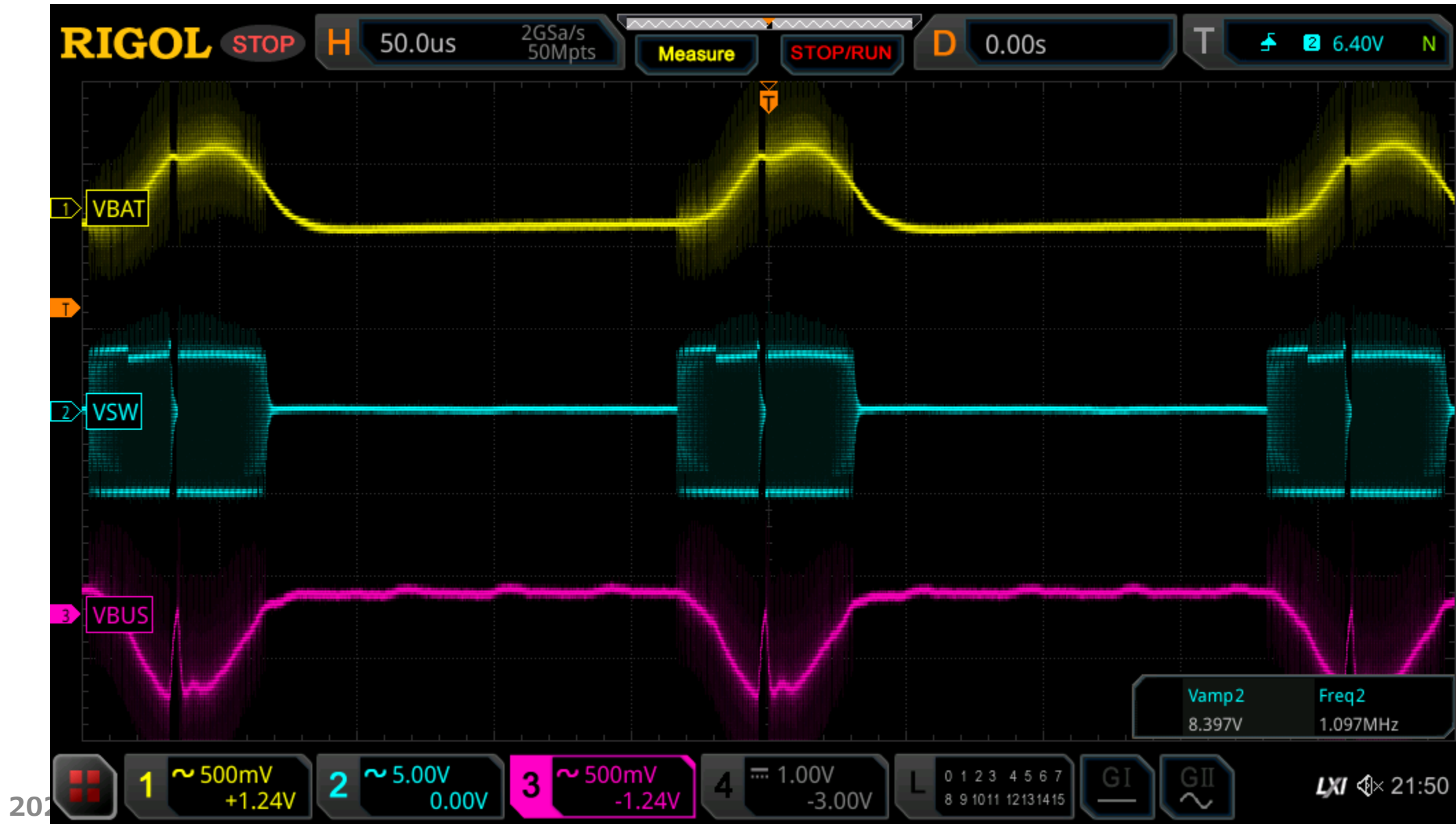


fig.4A waveforms when **audible noise** (IBUS = 1.4 A)

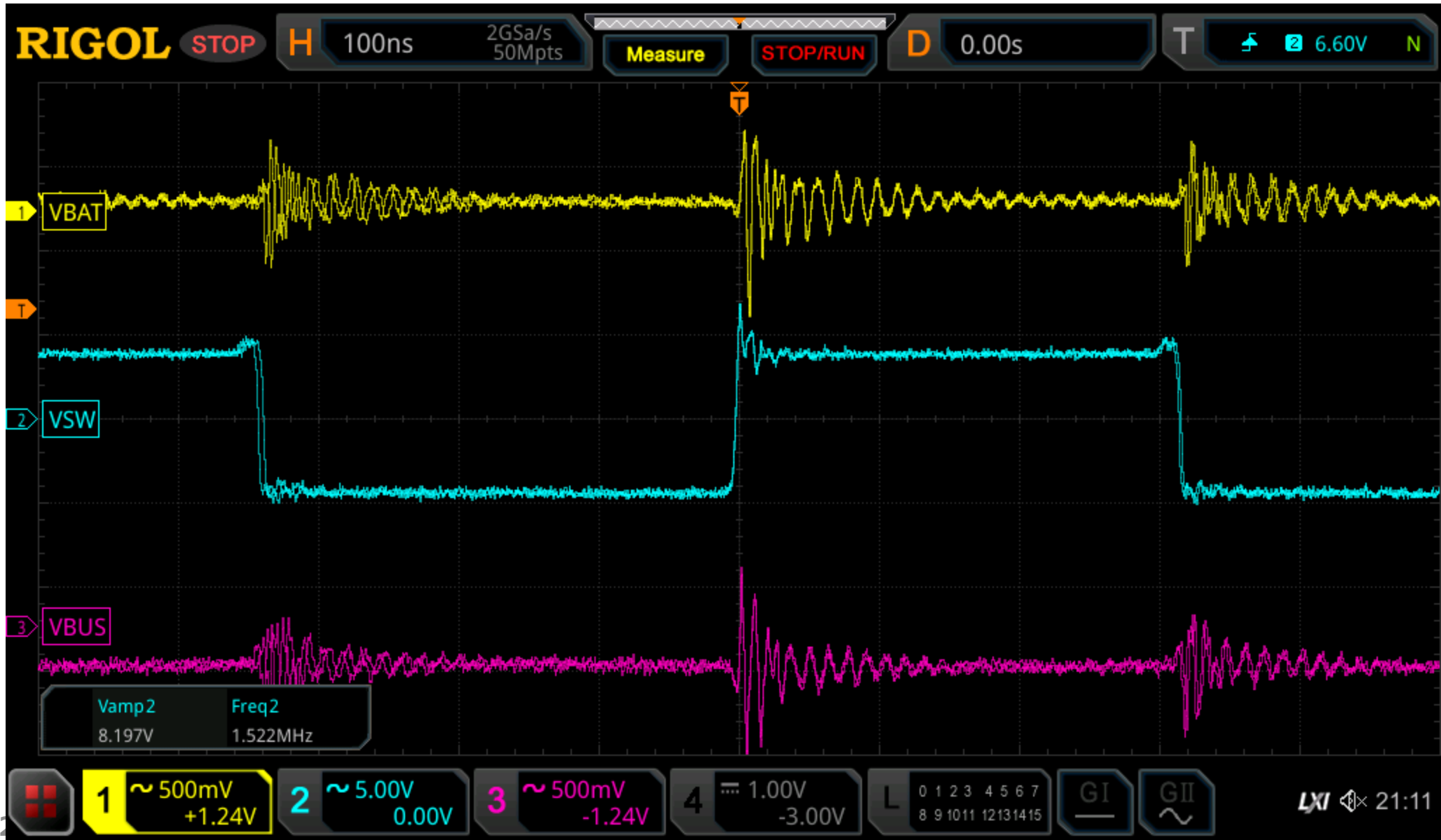


fig.4A waveforms when **audible noise** (IBUS = 1.4A)

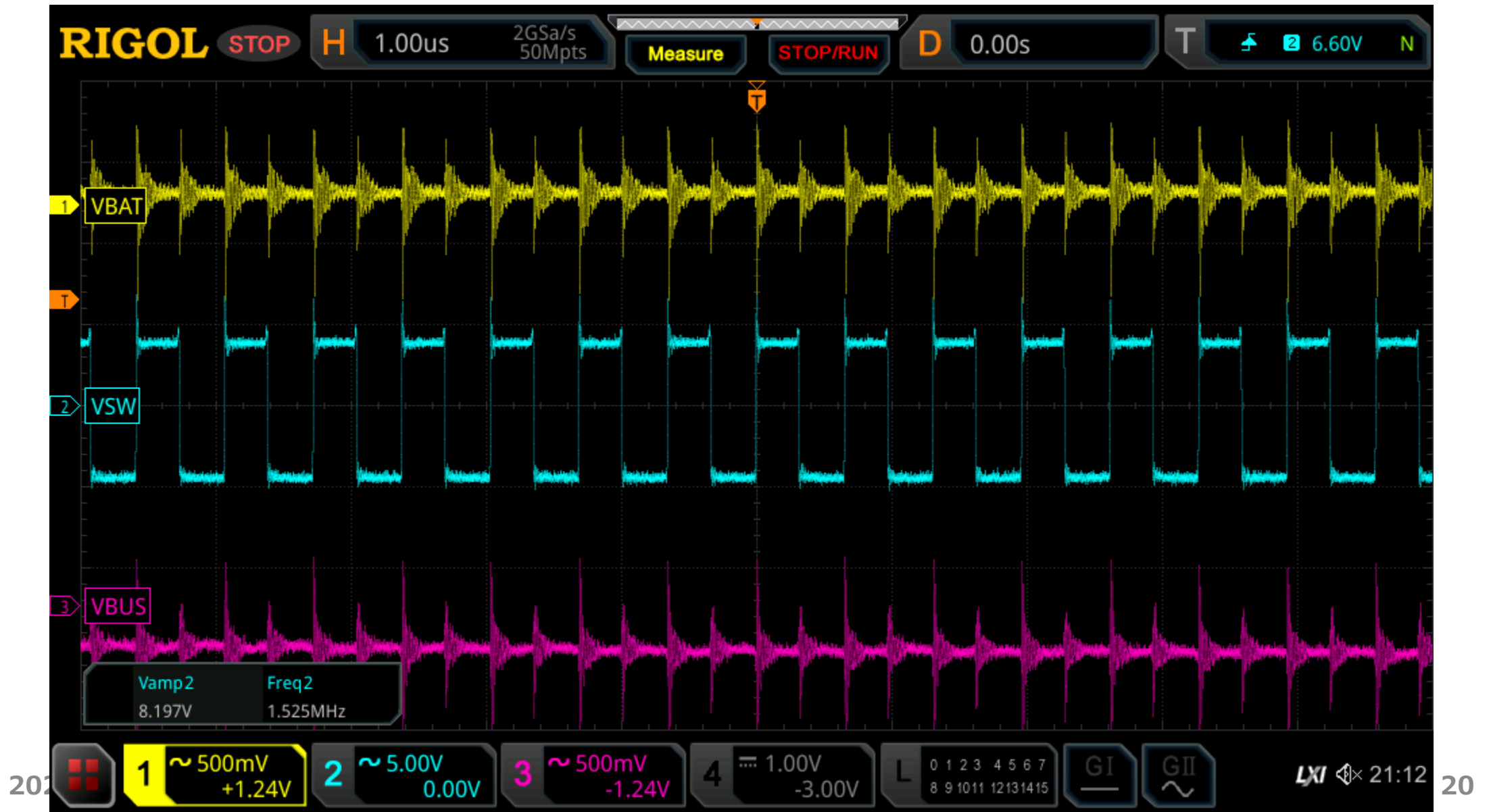
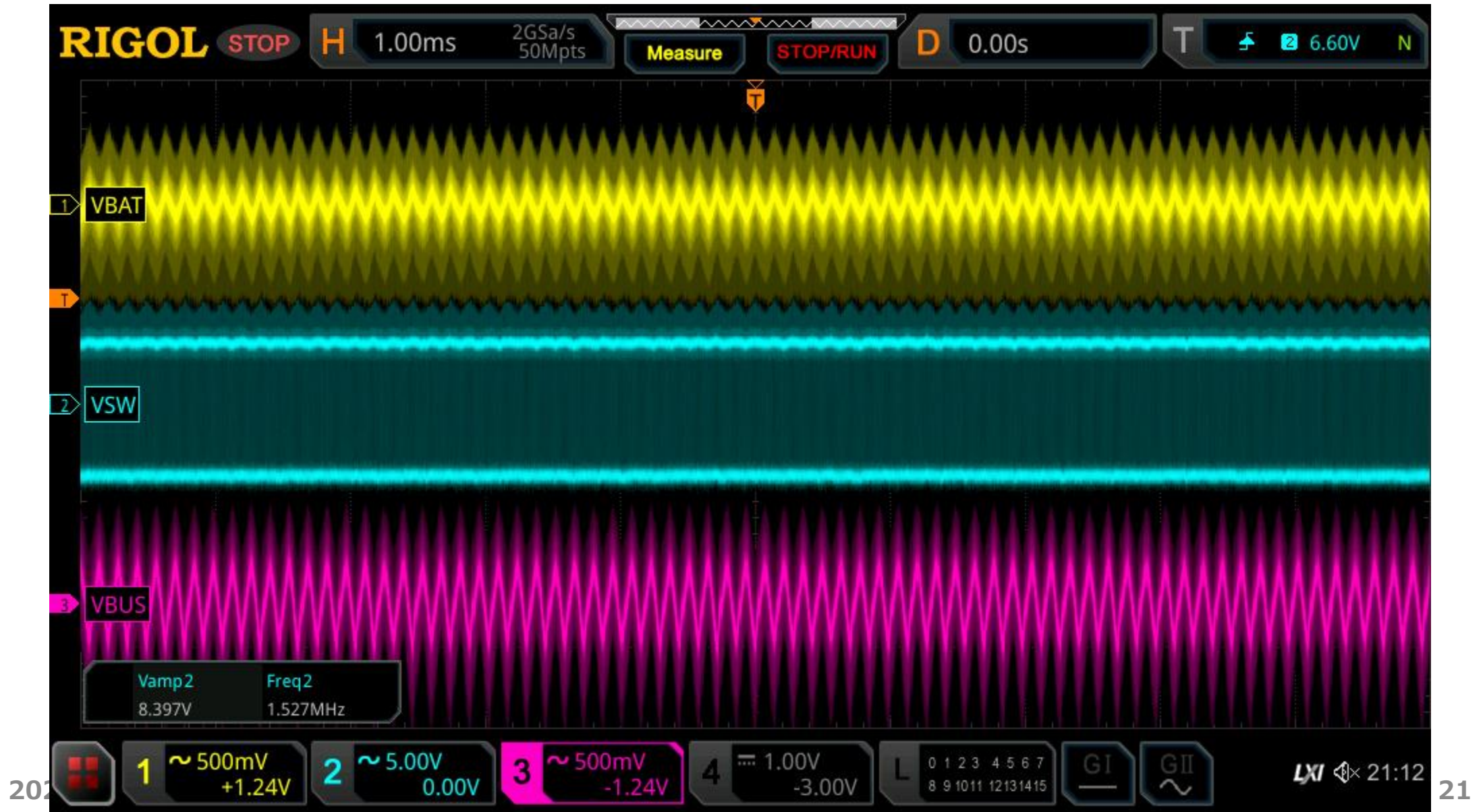


fig.4A waveforms when **audible noise** (IBUS = 1.4A)



Appendix

Recording with smartphone microphone near the sound

