AC562G1

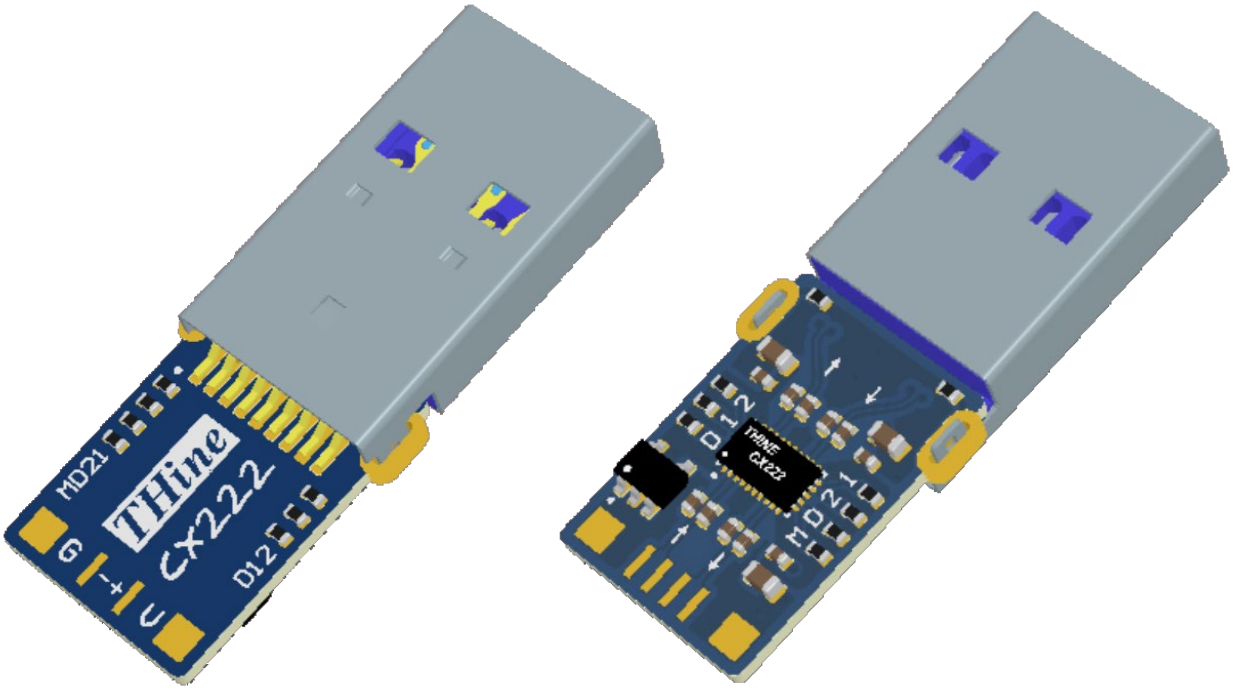
USB 3.0 / 3.1 Gen1 Active Paddle Card for TYPE-A

Introduction

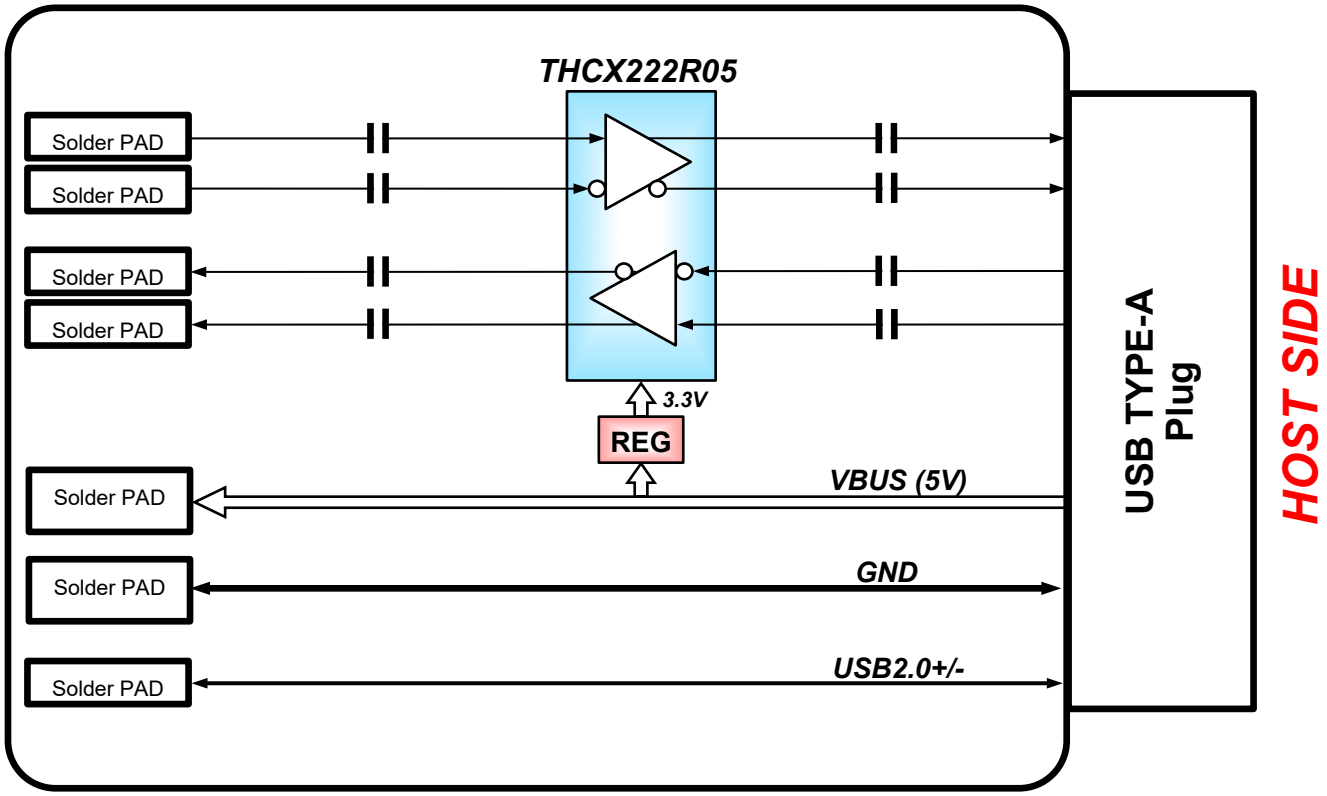
AC562G1 is a high performance active paddle card for USB 3.0/3.1 Gen1 up to 5Gbps and features a continuous time linear equalizer (CTLE) to provide a boost up to +11.6 dB. It opens an input eye due to inter-symbol interference (ISI) induced by long distance cable or thin wire cable.

Feature

- Supported USB Standard	:	USB 3.0 / USB3.1 Gen1 up to 5Gbps
- Interface Connector	:	TYPE-A PLUG & Cable soldering PAD
- Redriver IC	:	THCX222R05, THine Electronics, Inc.
- Adjustable Gain	:	8 levels setting by resistors up to +11.6dB (default +6.7dB)
- Power Supply	:	VBUS (5V)
- Power Consumption	:	0.4W typical, Ultra Low-Power Architecture
- Temperature Range	:	0°C to 70°C
- Module Size	:	width 12mm * length 35mm



Block Diagram

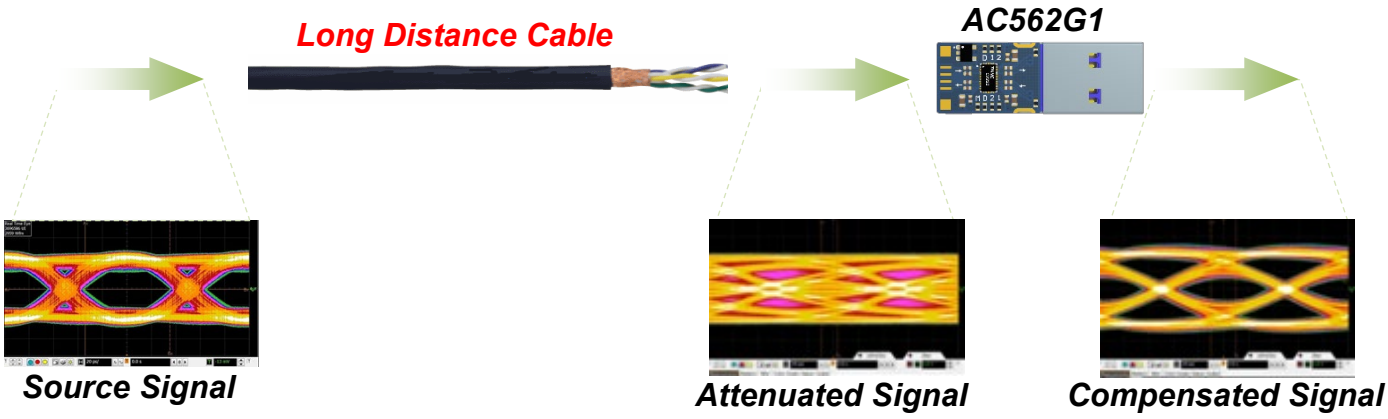


Condition

	Specification
Model	AC562G1
Supply Voltage	VBUS DC5V±10%
Power Consumption	0.4W Typ. (Reference data)
Operating Temperature	0℃～70℃
Storage Temperature	-40℃～125℃
Flammability	UL94V-0
Module Size	12mm * 35mm
PCB Color	Blue

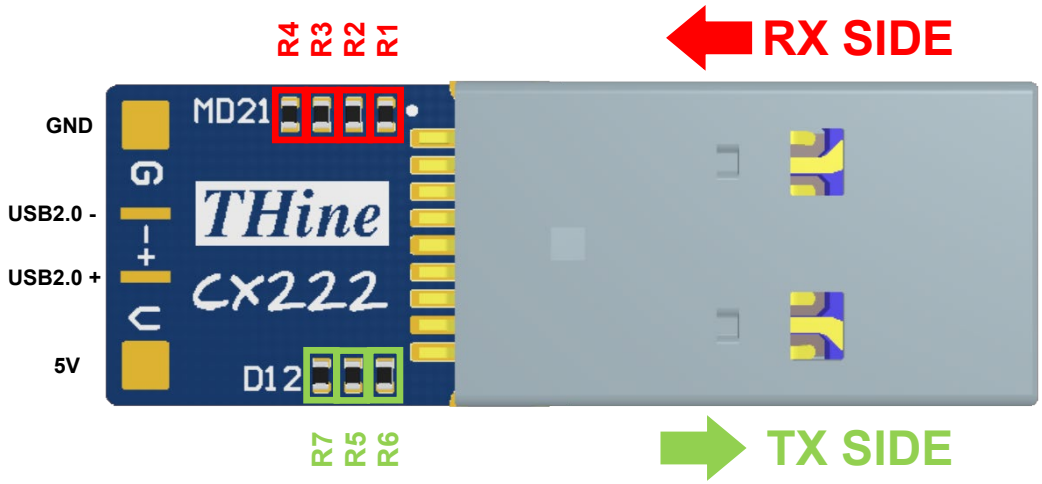
How to use

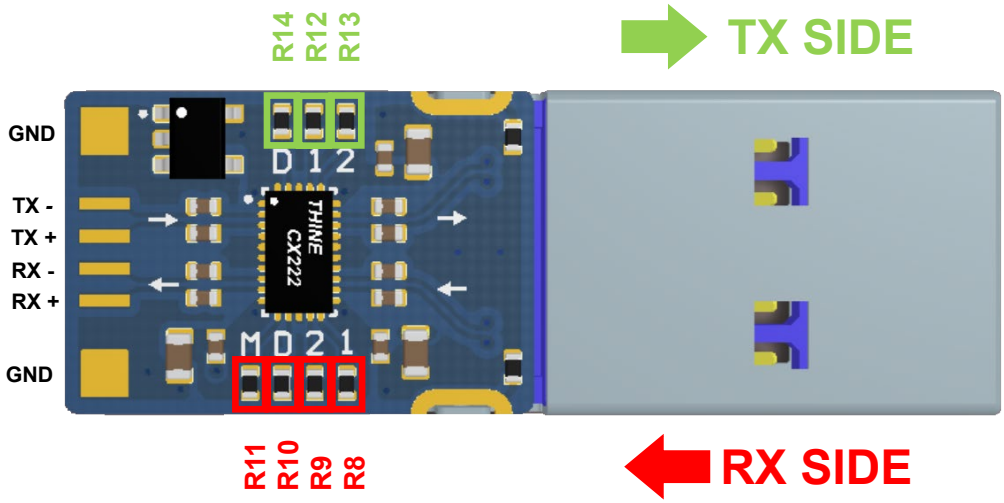
Please solder your twist pair cable to AC562G1. It recovers attenuated signal via the cable.
Default equalizer setting is +6.7dB and it will recover attenuated signal by about 8m of AWG32 cable.
Please adjust equalizer level against the cable characteristics.



Cable Soldering PAD & Resistor

Positions of cable soldering PAD and resistor are indicated as below.
AC562G1 has two kinds of gain setting (AC GAIN & DC GAIN) for each channel TX/RX.
Below resistors change the gain level.

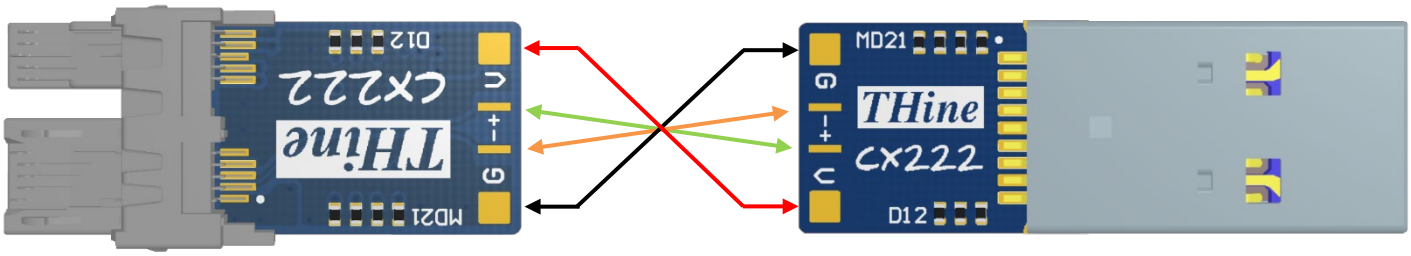




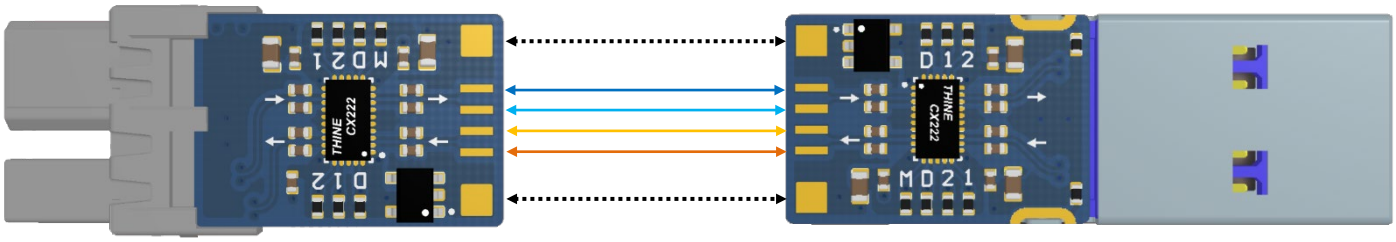
AC562G1 & AC563G1 Wiring

Wiring between AC562G1 and AC563G1 is indicated as below.

TOP SIDE Wiring

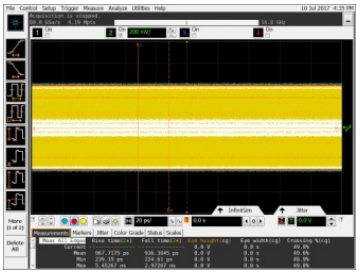


BOTTOM SIDE Wiring

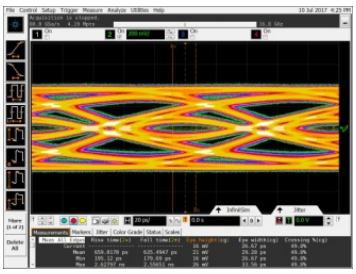


AC GAIN

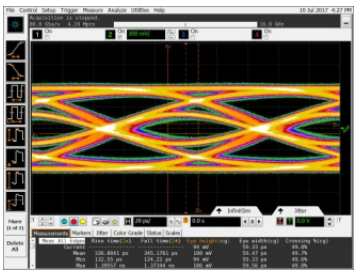
AC GAIN is a function to recover high frequency characteristics of USB signal.
Please adjust the AC GAIN to open eye diagram enough by 8 levels gain settings as below.



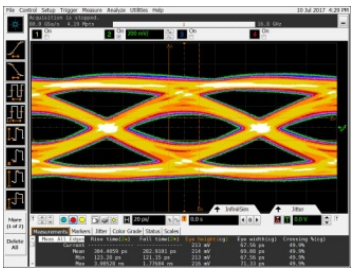
Input signal



AC Gain : +3.7dB (LEVEL 3)



AC Gain : +5.6dB (LEVEL 5)



AC Gain : +8.0dB (LEVEL 7)

SETTING TABLE for AC GAIN

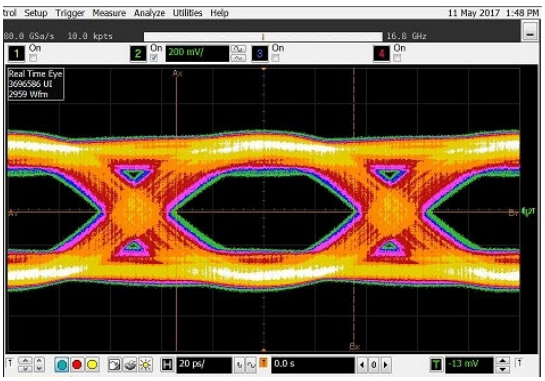
LEVEL	GAIN	TX				RX			
	[dB]	R5	R6	R12	R13	R1	R2	R8	R9
1	1.5	0	0	N.C.	N.C.	0	0	N.C.	N.C.
2	2.7	180k	0	N.C.	N.C.	180k	0	N.C.	N.C.
3	3.7	N.C.	0	N.C.	N.C.	N.C.	0	N.C.	N.C.
4	4.8	N.C.	0	0	N.C.	N.C.	0	0	N.C.
5	5.6	0	180k	N.C.	N.C.	0	180k	N.C.	N.C.
6	***6.7***	***180k***	***180k***	***N.C.***	***N.C.***	***180k***	***180k***	***N.C.***	***N.C.***
7	8.0	N.C.	180k	N.C.	N.C.	N.C.	180k	N.C.	N.C.
8	8.9	N.C.	180k	0	N.C.	N.C.	180k	0	N.C.

N.C : Not Connected

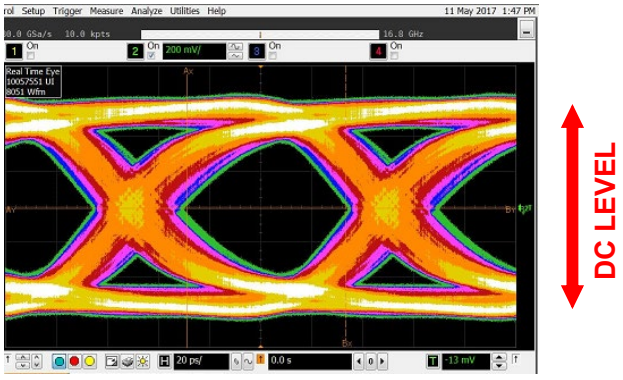
(default : LEVEL-6)

DC GAIN

DC GAIN is an adjustment function for DC LEVEL.
Please adjust the DC GAIN level to be eye-shaped diagram.
Recommendation setting is level-2 or level-3.



DC GAIN : +0.1dB
(LEVEL 3)



DC GAIN : +4dB
(LEVEL 4)

SETTING TABLE for DC GAIN

LEVEL	DC Gain [dB]	TX		RX	
		R7	R14	R3	R10
1	-2.2	0Ω	N.C	0Ω	N.C
2	-1.3	180kΩ	N.C	180kΩ	N.C
3	***+0.1***	***N.C***	***N.C***	***N.C***	***N.C***
4	+4.1	N.C	0Ω	N.C	0Ω

(Default : LEVEL-3)

DETECTION MODE

AC562G1 has two detection mode, SIGNAL-DETECT and RX-DETECT.
SIGNAL-DETECT detects input signal level.
The channel's input signal level determines whether the output is active.
RX-DETECT is automatic receiver detect function.
It will move to low power mode due to inactivity if receiver is not detected.
Each channel operates each detection mode fully independently.

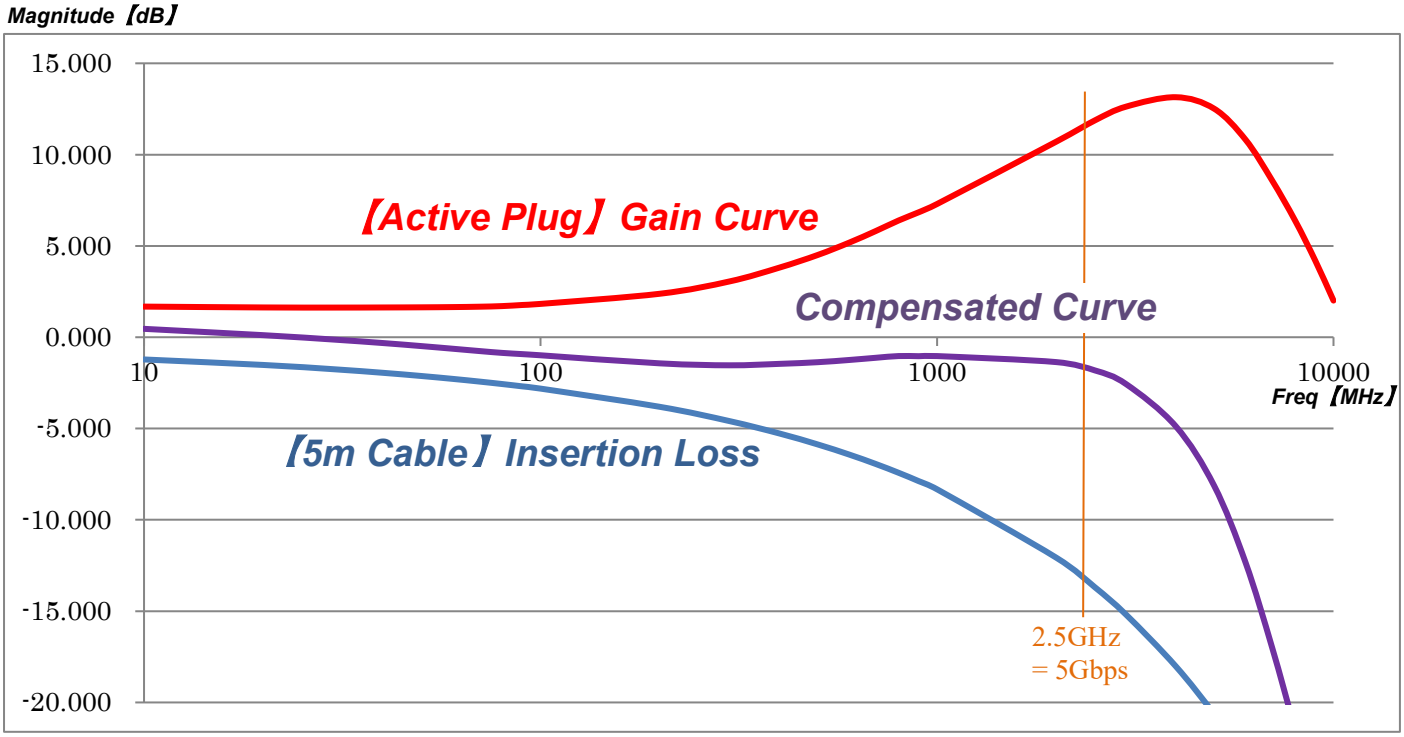
SETTING TABLE for DETECTION MODE

SETTING	MODE	R4
1	RX-DETECT Enable, SIGNAL-DETECT Enable	0
2	RX-DETECT Enable, SIGNAL-DETECT Disable	180k
3	**RX-DETECT Disable, SIGNAL-DETECT Disable**	**N.C**

(default : SETTING-3)

Simulation Result for “Frequency Response”

A simulation result of “frequency response” is indicated as below.
X-AXIS is FREQUENCY [unit:MHz] and Y-AXIS is MAGNITUDE [unit:dB].
“Insertion Loss” is an attenuation characteristics of cable and **“Gain Curve”** is an amplitude characteristic of AC562G1.
On the other hand, **“Compensated Curve”** indicates a compensated characteristics of 5m cable.
It is an addition result of “Insertion Loss” and “Gain Curve”.
The compensated curve is flat characteristics until 5Gbps frequency range and it indicates the compensated cable can transmit signal without loss.



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THine@cel.com