

# 3G/HD/SD-SDI Long Reach Adaptive Cable Equalizer Pin Compatibility to Legacy SDI Cable Equalizers

## Application Note

Products Affected: M31544, M31564, M21544, M21554, M21564, M21324, and M21424

### Scope

To facilitate the use of MACOM's latest long reach adaptive cable equalizer family as a drop-in compatibility replacement option. This application note offers detailed pin-by-pin descriptions for the devices that are pin compatible. [Table 1](#) lists the various options:

**Table 1. Long Reach Adaptive EQ Parts Compatibility**

New Long Reach Adaptive Equalizer Part	Pin Compatible to	Description
M21544 / M31544	Texas Instruments LM0395	Dual Output EQ, 24-pin QFN, 4x4 mm
M21554	MACOM M21424	Dual Output EQ, 32-pin QFN, 5x5 mm
M21564 / 31564	MACOM M21324 Texas Instruments LM0394 Semtech GS1574, GS2974A, GS2984 and GS3440	Single Output EQ, 16-pin QFN, 4x4 mm

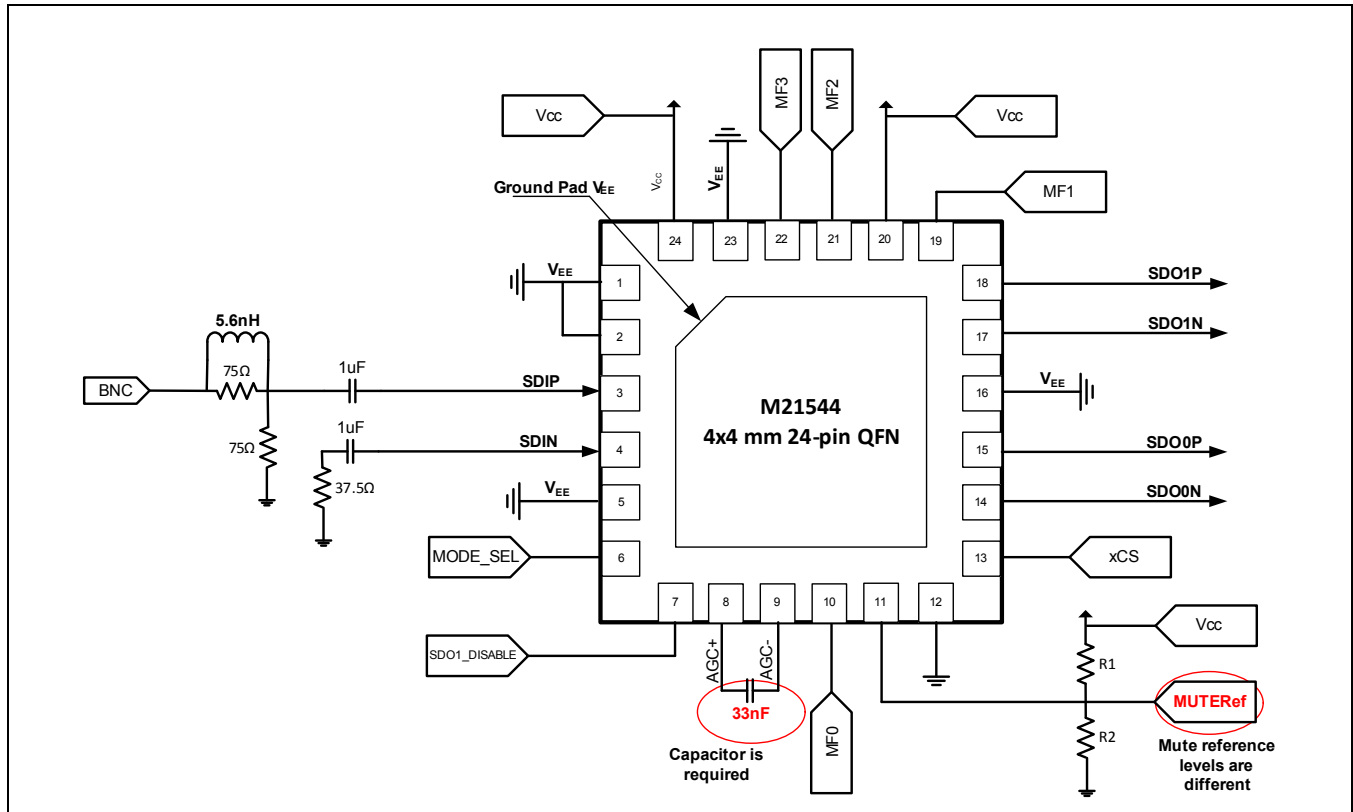
Note: The following parts are 100% pin compatible:

- M21544 => M31544
- M21564 => M31564

The only difference between the M215x4 and the M315x4 is the SPI interface. The M215x4 SPI is 18-bit base (legacy SPI interface) while the M315x4 is 16-bit base (new SPI interface). All new Macom 12G-SDI parts have the new SPI interface.

## M21544 Versus LM0395 Pin-by-Pin Description

Figure 1. Typical M21544 Implementation



Pin Number	M21544, M31544 Pin	LM0395 Pin	Functional Difference
1,2,5,12,16,23, Ground Pad	V <sub>EE</sub>	V <sub>EE</sub>	None
20,24	V <sub>CC</sub> (2.5V)	V <sub>CC</sub> (2.5V)	None. Same Supply
3,4	SDIP/SDIN	SDI [P/N]	None
15,14	SDO0P/SDO0N	SDO0[P/N]	None
18,17	SDO1P/SDO1N	SDO0[P/N]	None
6	MODE_SEL	SPI_EN	None
7	SDO1_DISABLE	SDO1_DISABLE	None
8,9	AEC+/-	AEC+/-	M21544: Equalizer loop filter capacitor (33 nF). Needed for the Jitter Cleaner loop filter. LMH0395: Optional Equalizer loop filter capacitor (1 uF)
10	MF0	BYPASS/Cdb	None
11	MUTERef	MUTERef	Threshold levels are different
13	xCS	V <sub>EE</sub> /SSb	None

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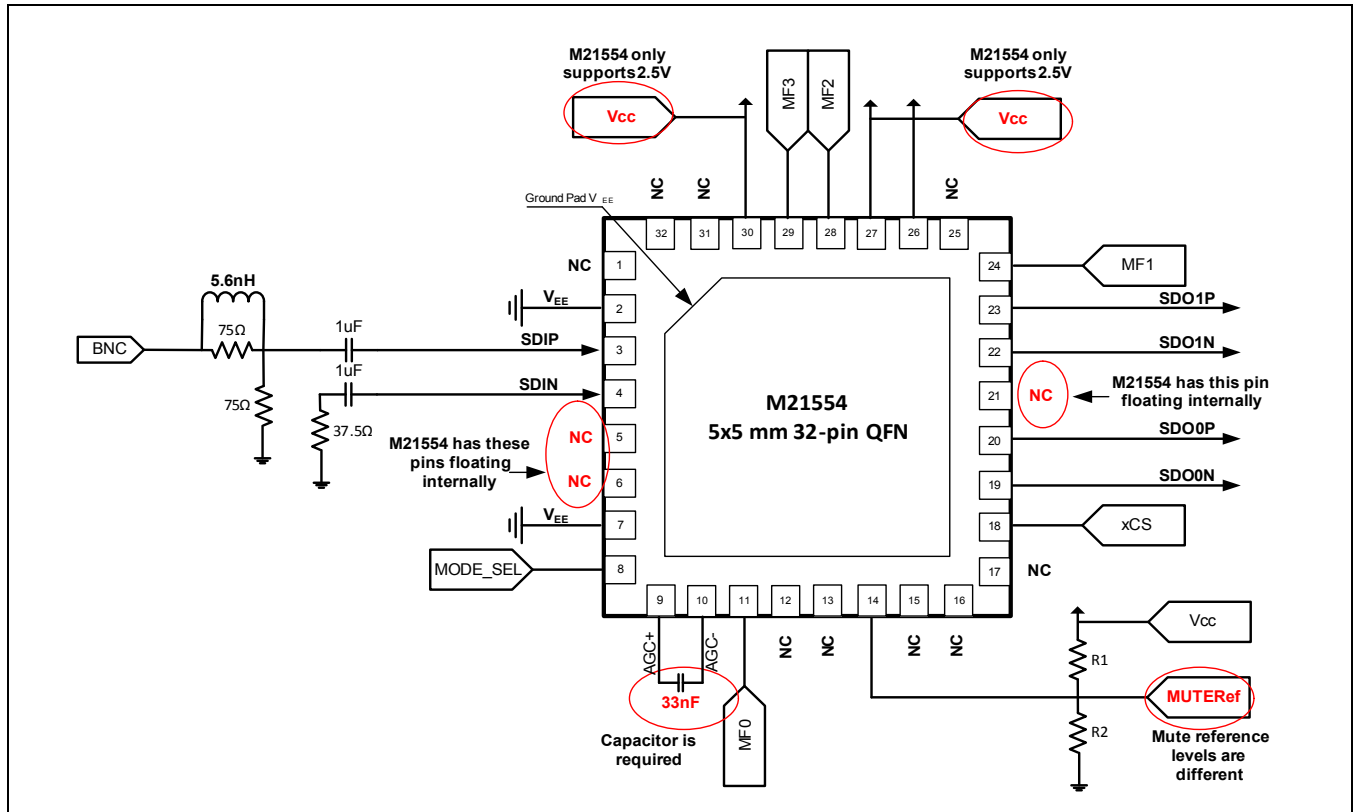
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Pin Number	M21544, M31544 Pin	LM0395 Pin	Functional Difference
19	MF1	AUTOSLEEP/MISO	None
21	MF2	MUTE/SCK	None
22	MF3	xSD/MOSI	None

## M21554 Versus M21424 Pin-by-Pin Description

Figure 2. Typical M21554 Implementation



Pin Number	M21554	M21424	Functional Difference
2,7, Ground Pad	V <sub>EE</sub>	AV <sub>SS</sub>	None
26,27,30	V <sub>CC</sub> (2.5V)	AV <sub>DD</sub> (2.5V and 3.3V)	M21554: Supports only 2.5 V
3,4	SDIP/SDIN	SDI[P/N]	None
20,19	SDO0P/SDO0N	SDO0[P/N]	None
23,22	SDO1P/SDO1N	SDO0[P/N]	None
8	MODE_SEL	AV <sub>SS</sub>	M21424 does not support digital interface M21554 set to Low = Hardware mode
9,10	AEC+/-	AEC+/-	M21424: External AGC (Automatic Gain Control) capacitor (1.0 uF) M21554: Equalizer loop filter capacitor (0.033 uF). Needed for the Jitter Cleaner loop filter.
11	MF0	EQ_BYP	None
14	MUTERef	THRESH	Threshold levels are different
17	xCS	Do Not Connect	M21554: Needed for digital interface
24	MF1	AV <sub>SS</sub>	M21554 set to Low = Automatic Power Down
28	MF2	SD/MUTE	M21554 input only, same function as M21424

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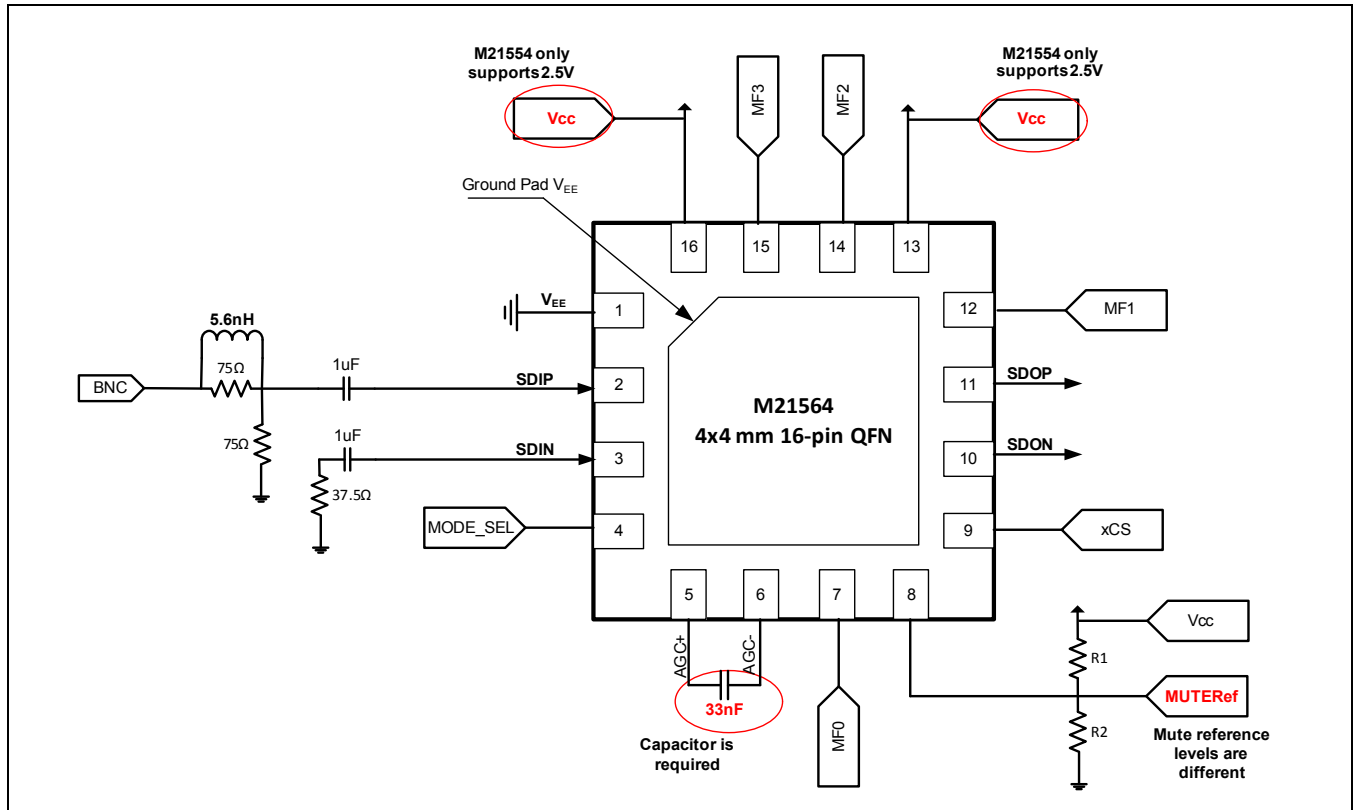
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Pin Number	M21554	M21424	Functional Difference
29	MF3	CLEN	M21424: Cable Length indicator (Analog voltage) M21554: Signal Detect (High or low, active low)
5	Do Not Connect	SDO2_EN	M21554: Not able to disable the second output in Hardware mode, only in software mode, register 01h.
6	Do Not Connect	SWING_L/H	M21554: Not able to control the output buffers' swing in Hardware mode, only in software mode, registers 01h and 02h.
21	Do Not Connect	AV <sub>DD</sub>	None. M21554 has this pad floating internally.
1,12,13,15,16,17,25,31,32	Do Not Connect	Do Not Connect	None

## M21564 Versus M21324, LMH0394, GS1574 and GS2974A Pin-by-Pin Description

Figure 3. Typical M21564 Implementation



Pin Number	M21564, M31564	M21324	LMH0394	GS1574	GS2974A, GS2984	GS3440	Functional Difference
1, Ground Pad	V <sub>EE</sub>	AV <sub>SS</sub>	V <sub>EE</sub>	V <sub>EE_A</sub>	V <sub>EE_A</sub>	V <sub>EE_A</sub>	None
13,16	V <sub>CC</sub> (2.5V)	AV <sub>DD</sub> (3.3V)	V <sub>CC</sub> (2.5V)	V <sub>CC_A</sub> , V <sub>CC_D</sub> (3.3V)	V <sub>CC_A</sub> , V <sub>CC_D</sub> (3.3V)	V <sub>CC_A</sub> , V <sub>CC_O</sub> (3.3V)	M21564: Supports only 2.5 V
2,3	SDIP/SDIN	SDI[P/N]	SDI [P/N]	SDI [P/N]	SDI [P/N]	SDI [P/N]	None
11,10	SDOP/SDON	SDO[P/N]	SDO0[P/N]	SDO[P/N]	SDO[P/N]	SDO[P/N]	None
4	MODE_SEL	AV <sub>SS</sub>	SPI_EN	V <sub>EE_A</sub>	V <sub>EE_A</sub>	V <sub>EE_A</sub>	For M21564 this feature can only be accessed via registers, must be set to low. LMH0394: M21564 also supports a 4-wire interface GS2984, GS3440: Gain Select, 6dB boost.

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Pin Number	M21564, M31564	M21324	LMH0394	GS1574	GS2974A, GS2984	GS3440	Functional Difference
5,6	AEC+/-	AGC+/-	AEC+/-	AEC+/-	AEC+/-	AEC+/-	M21564: Equalizer loop filter capacitor (33 nF). Needed for the Jitter Cleaner loop filter. LMH0394: Optional equalizer loop filter capacitor (1 uF)
7	MF0	EQ_BYP	BYPASS/xSD	BYPASS	BYPASS	BYPASS	None
8	MUTERef	THRESH	MUTERef	MCLADJ	MCLADJ	SQ_DJ	Threshold levels are different.
9	xCS	AV <sub>SS</sub>	SSb	V <sub>EE_D</sub>	V <sub>EE_D</sub>	OP_CTL	GS2984: CMSET must be set low to be compatible GS3440: When this pin is grounded, output swing = 800mVppd
12	MF1	AV <sub>SS</sub>	AUTOSLEEP/MISO	V <sub>EE_D</sub>	V <sub>EE_D</sub>	V <sub>EE_O</sub>	None. M21564/LMH0394 set to Low = Automatic Power Down
14	MF2	Do Not Connect	MUTE/SCK	MUTE	MUTE	SLEEP	M21564:MUTE (H) GS3440: H =Power down when no Signal. L = Always ON.
15	MF3	SD/MUTE	xSD/MOSI	Do Not Connect	xCD	xCD	M21564/LMH0394/GS2974A: Signal Detect (High or low, active low). Output Only M21324: Output: Signal Detect, Input: Force Mute

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