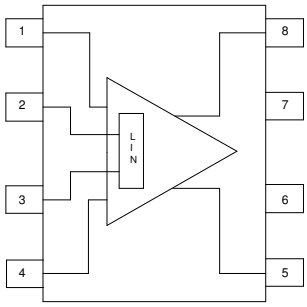
75 Ohm RF Amplifier **TAT7467H**
50-1002 MHz **Preliminary Datasheet**

Overview

The TAT7467 is a 75 Ohm true differential RF Amplifier covering medium power applications in the CATV band. The TAT7467 includes on-chip linearization to improve 3rd order distortion performance while maintaining low power consumption on a 5v supply. It is fabricated using 6-inch GaAs pHEMT technology to optimize performance and cost.

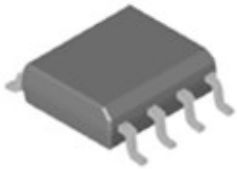
Features & Applications

- 75 Ohm, 40-1300 MHz Bandwidth
- Meets DOCSIS 3.0 Output Requirements
- On-chip Linearization for Third-order Efficiency
- Power Consumption: 5V, 350-380mA. SOIC-8
- Replacement for 5v SOIC-8 amplifiers
- Edge QAM Output Stage
- MDU Output
- Distribution amplifiers
- Transmitter Driver amplifier



Pin Configuration

Pin No.	Pin Name	Description
1	RF IN A	RF Input
2	LINA	Linearizer
3	LINB	Linearizer
4	RF IN B	RF Input
5	RF OUT B	RF Output
6	BIAS 2	Biasing
7	BIAS 1	Biasing
8	RF OUT A	RF Output
Exposed Slug	GND	Ground



Target Specifications: TAT7467H RF Amplifier

(Typical values, in Application Circuit)

Characteristic	Notes	Typical	Unit
Bandwidth		50-1002 MHz	MHz
RF Gain	1002 MHz	16.5	dB
Gain Flatness		0.75	+/- dB
Noise Figure		4.7	dB
Input Return Loss	To 1002 MHz	-18	dB
Output Return Loss	To 1002 MHz	-23	dB
Adjacent Triple Beats (3 tones, each 60 dBmV)	2 MHz spacing	-65	dBc
Equiv Harmonics (3 tones, each 60 dBmV)	2 MHz spacing	-70	dBc
Idd	5V	380	mA

(note: see definition of terms in Performance Data section)

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Application Overview

The TAT7467 is a flexible 5v differential amplifier for medium power CATV applications.

The amplifier of the TAT7467 was specially designed to work with on-chip linearization to provide 3rd order distortion improvement over a wide range of RF power levels and across the full CATV bandwidth. Operation of the linearizer will not affect overall gain by more than 0.7 dB.

For any amplifier bias current, output 3rd order distortion may be improved by adjusting a small bias current of the on-chip linearization circuit. The Application Schematic shows a microprocessor controlled voltage source setting the linearizer currents. Alternate linearizer drive circuitry is possible; consult TriAccess for discussion.

Bias current may be adjusted with changes to external components making the TAT7467 ideal for both input and output gain stages in an EdgeQAM amplifier line-up. For output stage applications, bias currents of between 300mA to 400mA are recommended. For input stage applications, bias currents of 230 to 280mA are recommended.

For best performance the TAT7467 bias may be controlled with an active bias circuit as shown in the Application Schematic. The controlled current is referenced to a precision voltage source, commonly found on microprocessors or from a low cost voltage reference.

The TAT7467 is built using a single die, which significantly improves its resulting circuit balance and corresponding 2nd order distortion performance. For best 2nd order performance, an input balun using a 3rd wire construction may be used to improve the input phase balance going into the TAT7467.

The TAT7467 is packaged in an industry standard SOIC-8 package with a large exposed paddle to enable good heatflow to a backside heatsink. At the maximum recommended bias current of 400mA, the power consumption will be 2W. The TAT7467 is fabricated using a mature pHEMT process that has demonstrated outstanding reliability performance on other TriAccess products. Please consult TriAccess for further information.

EdgeQAM Output Section Options

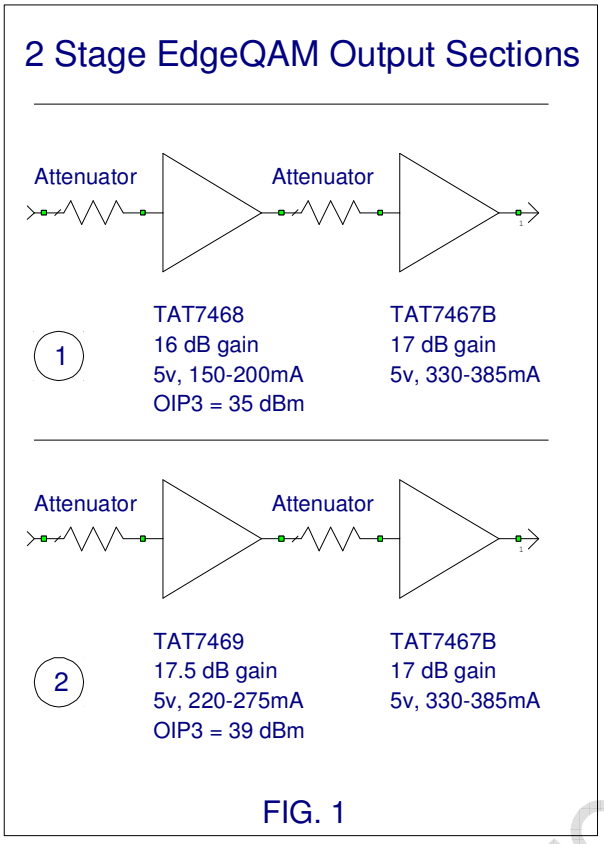


FIG. 1

The TAT7467 provides enough gain to enable EdgeQAM output sections to be designed with two gain stages rather than three. Figure 1 shows how the TAT7468 or TAT7469 can act as the input stage to drive the 7467. The combined amplifier gain will be more than 33 dB. By adjusting the bias downward, the 7467 may also be used as the input stage.

The loss of the interstage variable attenuator will largely determine which input stage device is the best choice. Attenuators with large amounts of minimum attenuation will require higher levels of linearity from the input stage to preserve cascaded linearity. For those designs, the 7469 is the better choice.

Should most of the variable attenuation be placed on the input side of the 1st stage, the linearity requirements of the 1st stage may be relaxed. In this case, the lower supply current of the 7468 provides further improvement in power efficiency.

The gain of the 7467 in the Application Schematic is typically 17 dB at 1000 MHz. The baluns used in the Application Schematic include a third winding to improve the balance and control the 2nd order distortion terms. The balun listed operates to 5 MHz and has high loss for a 1:1 balun. Alternate baluns can be built with reduced loss. The 7467 amplifier gain with ideal baluns is over 18.5 dB at 1000 MHz.

Linearizer Operation

Third order distortion performance of the amplifier may be adjusted by controlling the VLIN terminal on the Application Schematic. To disable the linearizer, set VLIN to 5v which will set the linearizer currents, ILINA and ILINB to 0.

For best performance, VLIN may be adjusted over frequency and temperature. Use of the active bias in the Application Schematic will make the optimum VLIN more consistent over temperature and part variations.

Optimum VLIN for minimizing the adjacent channel distortions will be near the optimum VLIN to minimize the 3rd order distortions. A compromise value of VLIN can be found that provides for both good adjacent channel performance and 3rd harmonics.

Application Schematic (with TAT7467B)

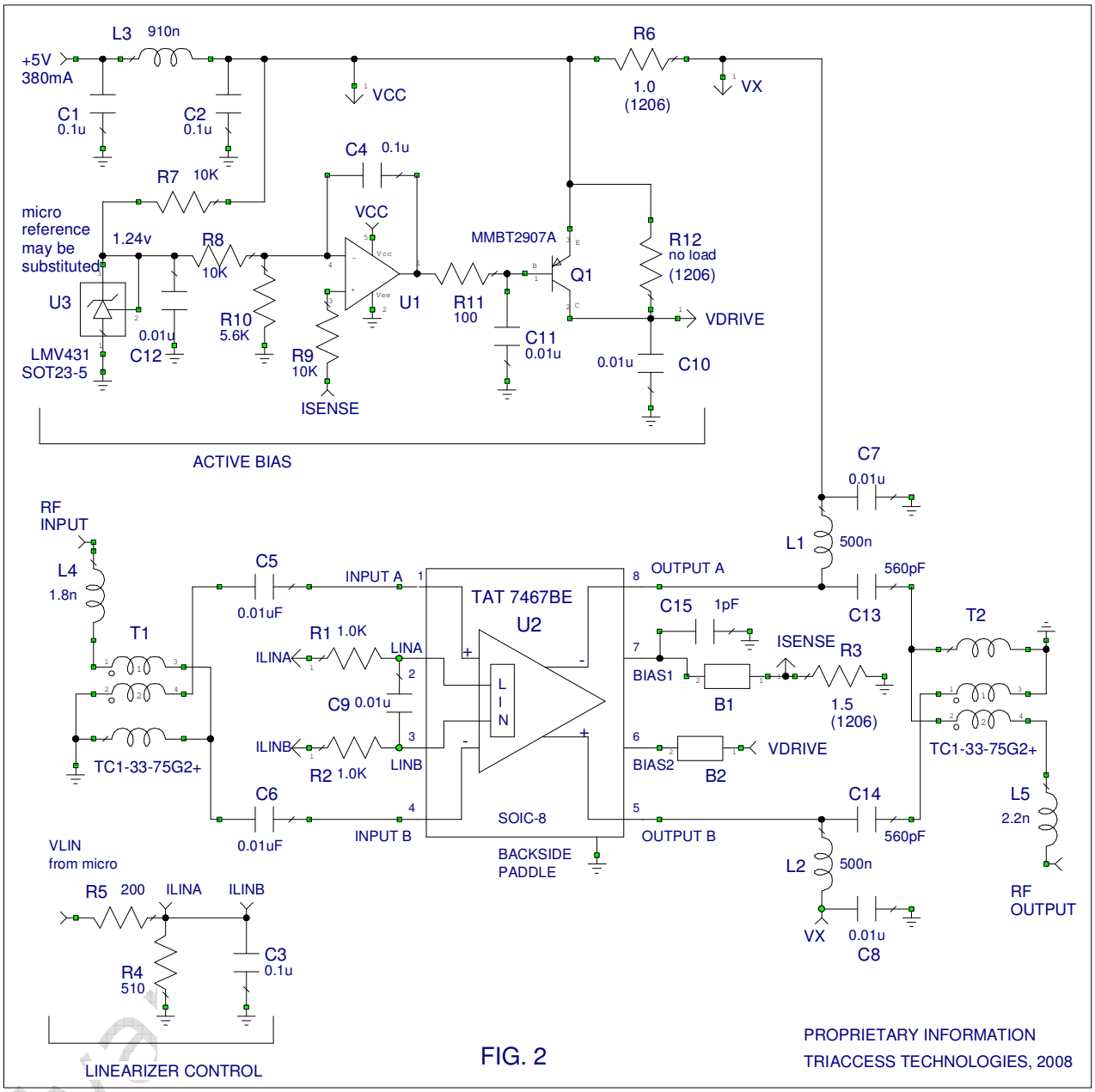
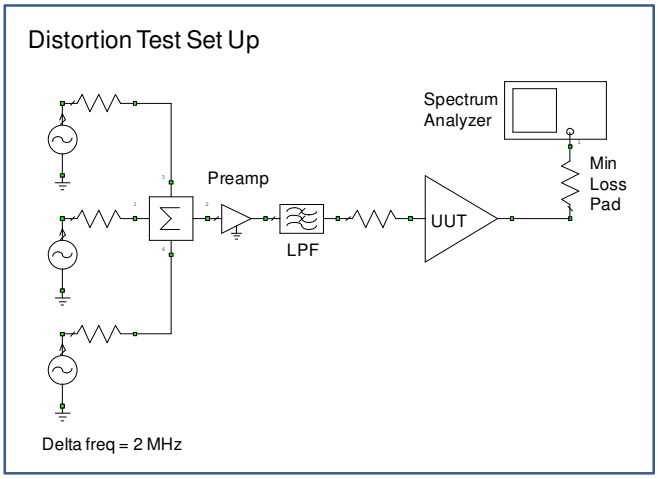


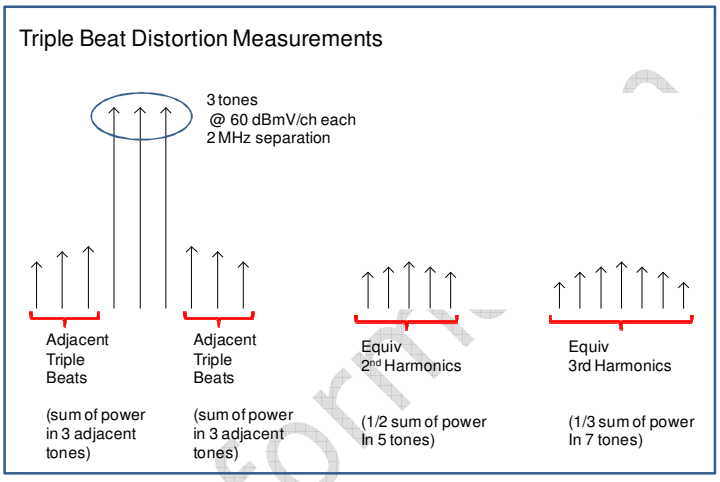
FIG. 2

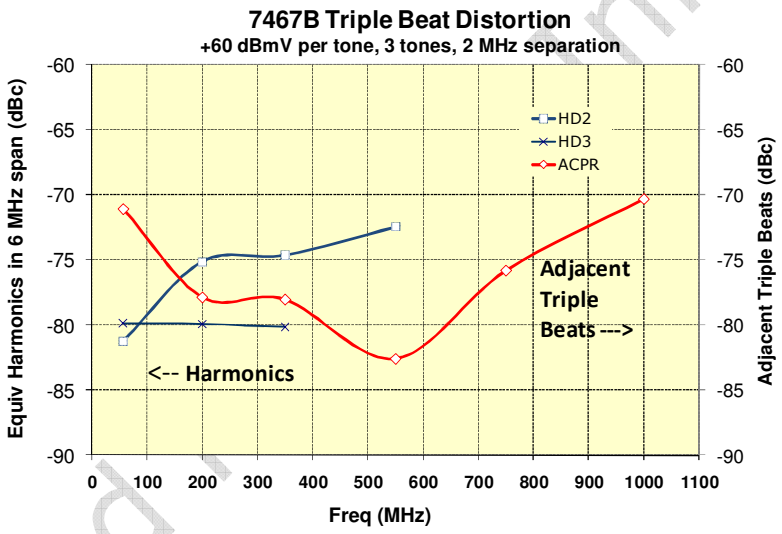
Bill of Materials

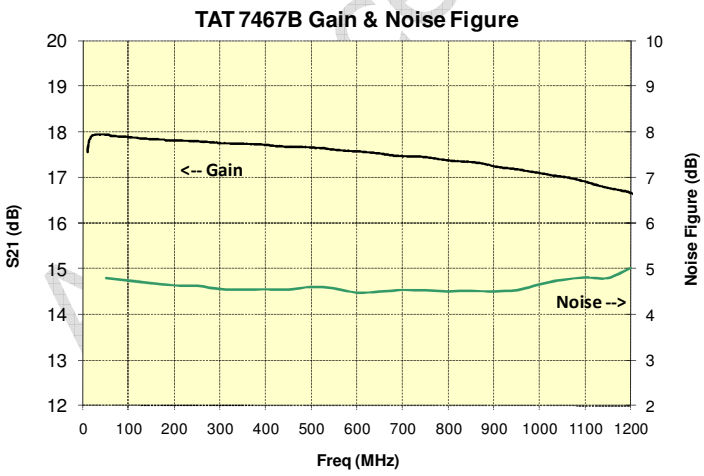
REFERENCE DESIGNATOR	VALUE / DESCRIPTION	MFG	MFG PN
B1	Ferrite Bead	MuRata	BLM15EG221SN1
B2	Ferrite Bead	MuRata	BLM15HG102SN1
C1,2,3,4	0.1uF	KOA	X7R0402CTTP104K
C5,6,7,8,9,10,11,12	0.01uF	AVX	0402YC103KAT2A
C13,14	560pF	AVX	04025C561KAT2A
C15	1pF	AVX	04025A1R0BAT2A
J1,2	SMB connector	Johnson	131-8701-206
L1,2	500nH	Coilcraft	LQH31HNR50K
L3	910nH	Coilcraft	1008AF-901XKL
L4	1.8nH	Coilcraft	0402CS-1N8XJLW
L5	2.2nH	Coilcraft	0402CS-2N2XJLW
Q1	PNP transistor	Diodes Inc	MMBT2907A
R1,2	1.0K ohms	Dale	CRCW04021K00FKED
R3	1.5 ohms, 1% (1206)	KOA	RK73H2BLTD1R50F
R4	510 ohms	Dale	CRCW0402510RJNED
R5	200 ohms	Dale	CRCW0402200RJNED
R6	1.0 ohm (1206)	KOA	RK73H2BTTD1R00F
R7,8,9	10K ohms	Dale	CRCW040210K0JNED
R10	5.6K ohms	Dale	CRCW04025K60JNED
R11	100 ohms	Dale	CRCW0402100RJNED
R12	no load (1206)	Dale	TBD
T1,2	1:1 Balun	MiniCircuits	TC1-33-75G2+
U1	Op Amp (rail-rail)	National	LM7301
U2	RFIC Amplifier	TriAccess	TAT 7467BE
U3	Voltage reference	National	LMV431

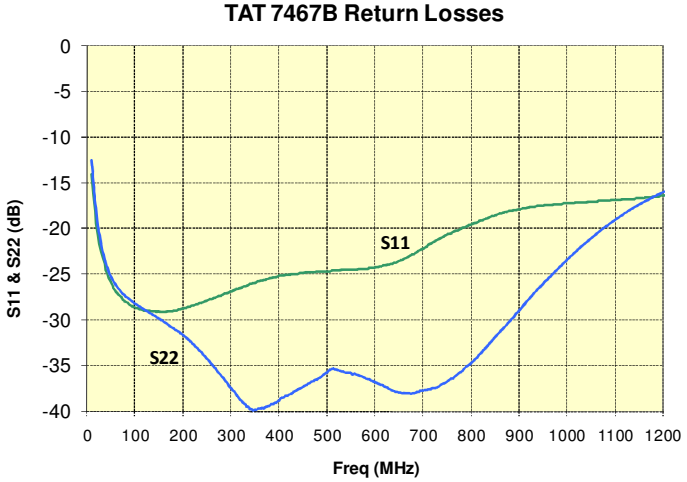
Performance Data (on TAT7467B)











Ordering Information

Part Number	Description	Package Description	Component Packaging
TAT7467B-EB	Evaluation Board		
TAT7467B-SC8	RFIC, 50-1300MHz , push pull amplifier	RoHS Compliant SOIC-8	1,000 pieces Tape and Reel
TAT7467D-EB	Evaluation Board		
TAT7467D	RFIC, 50-1300MHz, push pull amplifier sample	RoHS Compliant SOIC-8	Engineering Samples
TAT7467H-EB	Evaluation Board		
TAT7467H-SC8	RFIC, 50-1300MHz , push pull amplifier	RoHS Compliant SOIC-8	1,000 pieces Tape and Reel

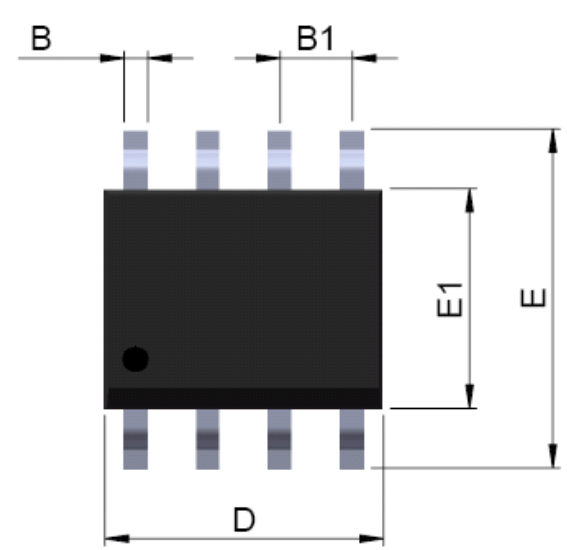
Absolute Maximum Ratings

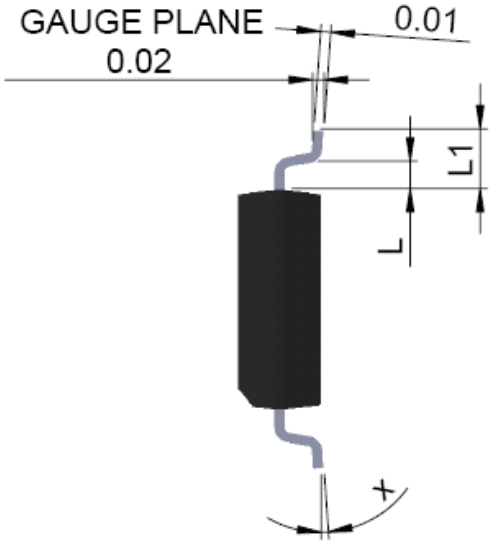
Parameter	Absolute Maximum
RF Input Power	TBD
Voltage	10.0 volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-60°C to +150°C

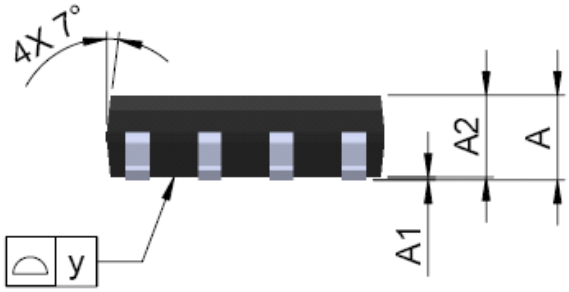
ESD Classification and Moisture Sensitivity Level

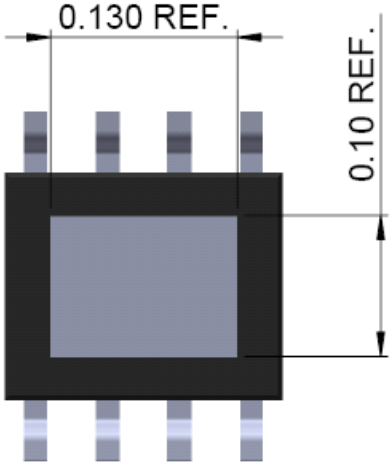
Parameter	Targets
ESD Classification	
- Human Body Model	Class 1B, 500V
- Machine Model	Class IV, 2000V
Moisture Sensitivity Level	Level 3
RoHS	RoHS compliant per EU directive

Mechanical Dimensions (SOIC8, TAT7467H-SC8)









BOTTOM VIEW

EXPOSED PADDLE

SYMBOL	MIN	NOM	MAX
A	0.054	0.059	0.068
A1	0.00		0.004
A2		0.057	
B	0.013		0.020
B1		0.050	
C	0.007		0.010
D	0.189		0.197
E	0.228	0.236	0.244
E1	0.150	0.153	0.157
L	0.016		0.050
L1	0.037	0.041	0.045
x	0		8
y			0.004

DIMENSIONS ARE IN INCHES

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