TSL8329M-EVB-A

Application Note

3300MHz~4000MHz

5.0V 90mA-HG mode

5.0V 45mA-LG mode

Rev-1.1

2022-09-23

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1. GENERAL DESCRIPTION

The TSL8329M is a dual-channel, integrated RF, front-end, multichip module designed for different applications. The device operates from 2.0 GHz to 4.2GHz. The TSL8329M is configured in dual channels with a cascading, two-stage, LNA and a high GaN based SPDT switch. In high gain mode, the cascaded two-stage LNA and switch offer a low noise figure of 1 dB and a high gain of 32 dB at 3.6 GHz with an output third-order intercept point (OIP3) of 35 dBm (typical) at high gain mode. In low gain mode, one stage of the two-stage LNA is in bypass, providing 13 dB of gain at a lower current of 45 mA. In power-down mode, the LNAs are turned off and the device draws 5 mA. In transmit operation, when RF inputs are connected to a termination pin (TERM-CHA or TERM-CHB), the switch provides low insertion loss of 0.45 dB at 3.6GHz and handles long-term evolution (LTE) average power (9 dB peak to average ratio (PAR)) of 43 dBm for full lifetime operation. The device comes in an RoHS compliant, compact, 6 mm × 6 mm, 40-lead LFCSP.

TSL8329M-EVB-A is an evaluation board specially tuned for frequency range of 3300MHz~4000MHz applications. Its application in the areas of Wireless infrastructure, TDD massive multiple input & multiple output, active antenna systems, TDD-based communication systems etc.

TSL8329M-EVB-A Board Design

2. TSL8329M-EVB-A SCHEMATIC

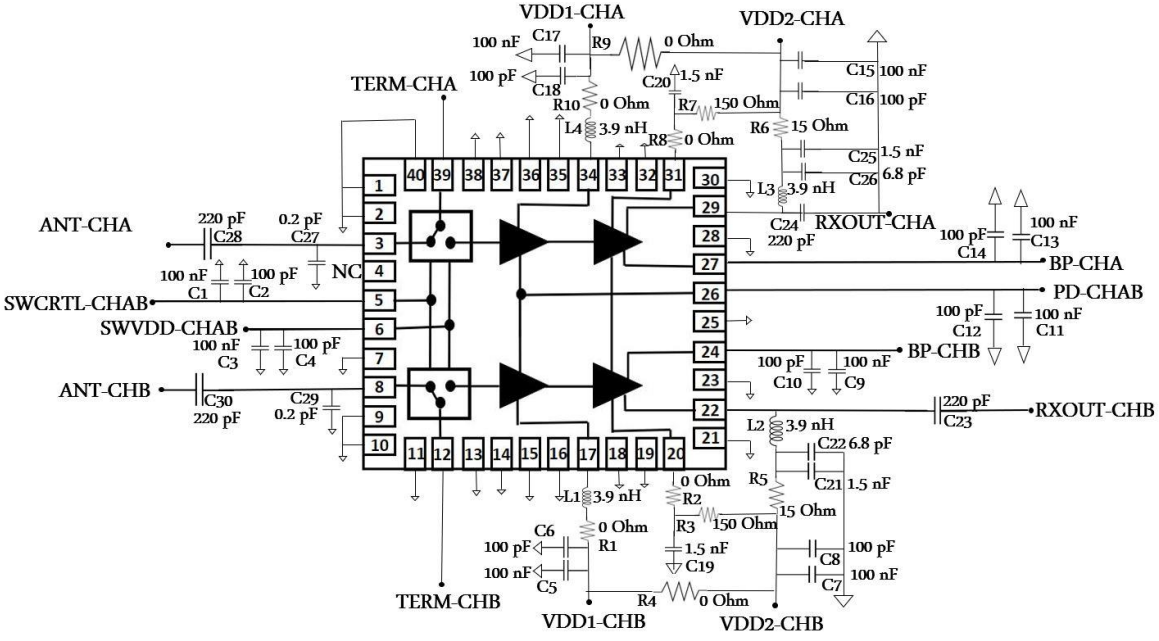

Figure 1 TSL8329M-EVB-A 3300MHz ~ 4000MHz schematic

3. TSL8329M-EVB-A LAYOUT

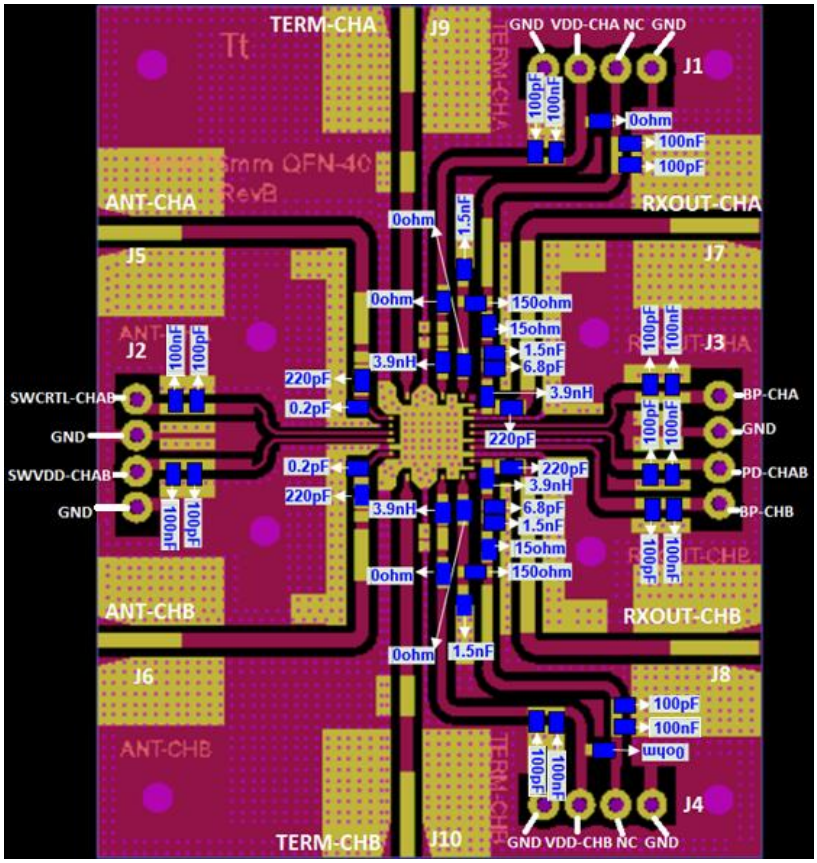

Figure 2 TSL8329M-EVB-A 3300MHz ~ 4000MHz layout

4. TSL8329M-EVB-A BILL OF MATERIAL

Component ID	Value	Manufacturer	Recommended Part Number	Qty
R1, R2, R4, R8, R9, R10	0Ω	Panasonic	ERJ-2GE0R00X	6
R3, R7	150Ω	Panasonic	ERJ-2RHD1500X	2
R5, R6	15Ω	Panasonic	ERJ-H2RD15R0X	2
L1, L2, L3, L4	3.9nH	Coil craft	0402HP-3N9XGRW	4
C22, C26	6.8pF	Murata	GJM1555C1H6R8BB01D	2
C19, C20, C21, C25	1.5nF	Murata	04025C152JAT2A	4
C23, C24, C28, C30	220pF	Kemet	C0402C221K5GACAUTO	4
C27, C29	0.2pF	Murata	GJM1555C1HR20BB01D	2
C2, C4, C6, C8, C10, C12, C14, C16, C18	100pF	AVX	04025A101JAT4A	9
C1, C3, C5, C7, C9, C11, C13, C15, C17	100nF	TDK	C1005X7R1H104K050BE	9
PCB	Rogers RO4350B, 20 mils, 1 oz copper			1

5. TSL8329M-EVB-A BOARD MEASUREMENT RESULTS

5.1. TSL8329M-EVB-A TEST RESULTS

All the tests are carried out at room temperature.

5.2. Summary

Parameter	Test Condition	Typical Values	Unit
Operational frequency Range		3.3-4.0G	Hz
Gain	HG	35-30	dB
	LG	13-12	dB
Noise Figure (De-embedded)	HG	0.9-1.2	dB
	LG	0.9-1.2	
EVB Noise Figure	HG	1.4-1.3	dB
	LG	1.4-1.3	
Input Return Loss	HG	Less than -6	dB
	LG	Less than -9	dB
Output Return Loss	HG	Less than -8	dB
	LG	Less than -4	dBm
OP1dB	HG	18-21	dBm
	LG	8-10.5	dBm
OIP3 (With 1MHz tone spacing)	0dBm per tone,	32-37	dBm
	-2dBm per tone,	17-21	dBm
Current, Id	HG	90	mA
	LG	45	
	PD	5	
Insertion Loss	Transmit operation at 3.6 GHz	0.45	dB
Channel to Channel Isolation Between RXOUT -CHA & RXOUT -CHB	At 3.6GHz Receive operation	40	dB
Between TERM-CHA AND TERM-CHB	Transmit operation	55	dB
SWITCH ISOLATION ANT-CHA to TERM-CHA and ANT-CHB to TERM-CHB	Transmit operation, PD-CHAB = 0 V	25	dB

Figure 3 TSL8329M-EVB-A Electrical Characteristics Summary

5.3. S parameters.

Figure 4 S parameters of HG mode of TSL8329M-EVB-A

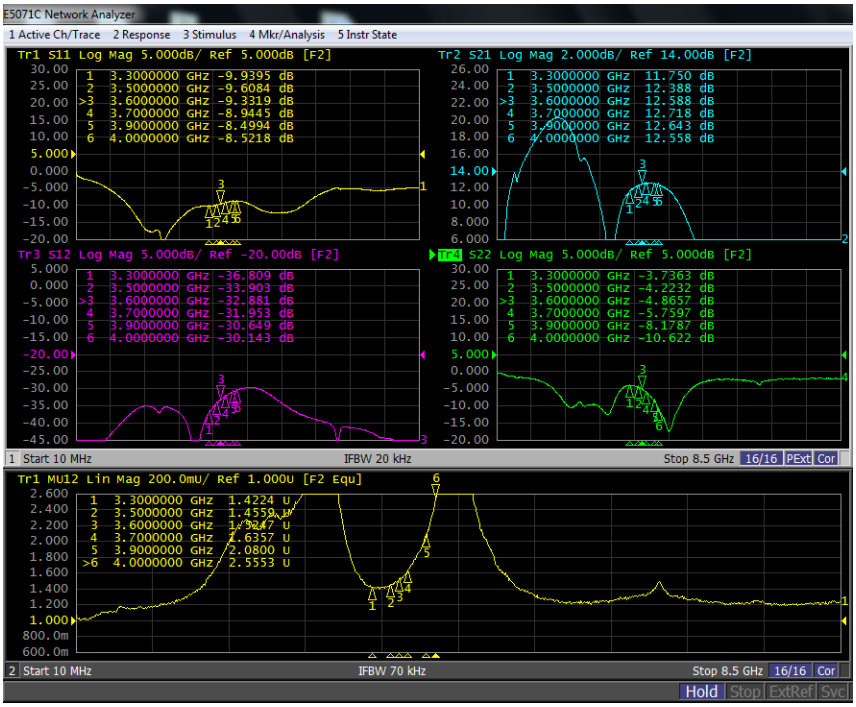

Figure 5 S parameters of LG mode of TSL8329M-EVB-A

5.4. De-embedded Noise Figure.

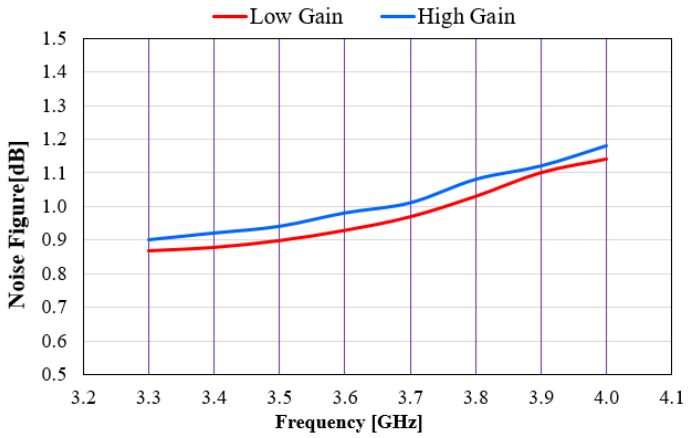

Figure 6 De-embedded NF of LG, HG mode of TSL8329M-EVB-A

5.5. Large Signal Test Results.

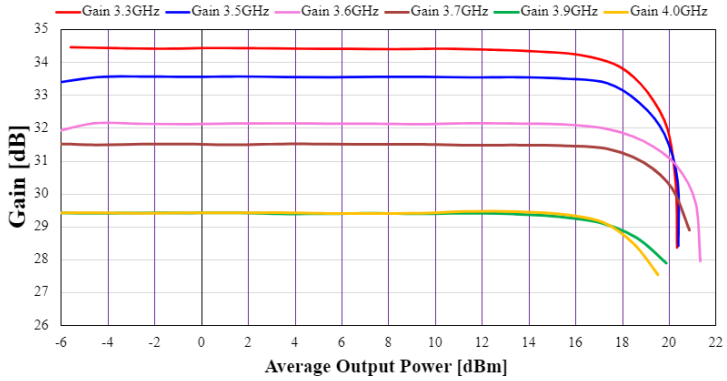

Figure 7 Gain Vs Pout of HG mode of TSL8329M-EVB-A

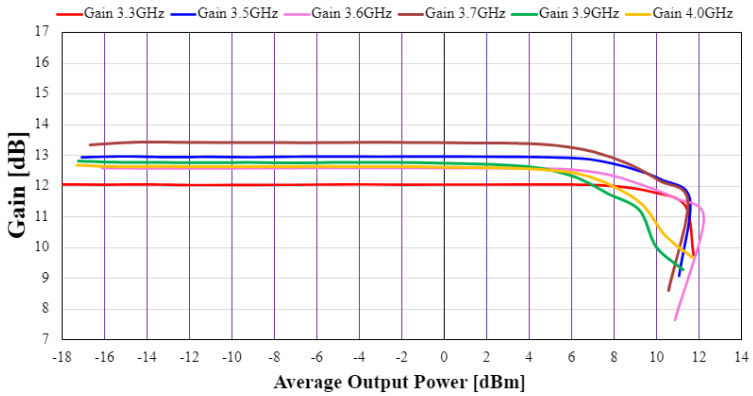

Figure 8 Gain Vs Pout of LG mode of TSL8329M-EVB-A

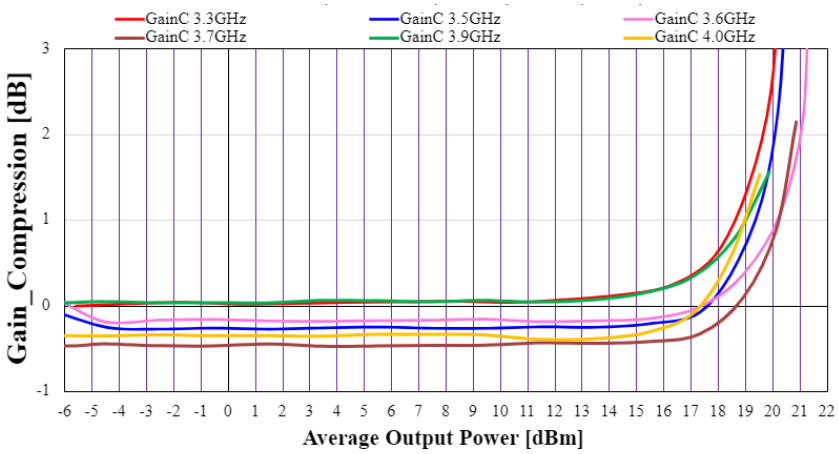

Figure 9 Gain compression Pout of HG mode of TSL8329M-EVB-A

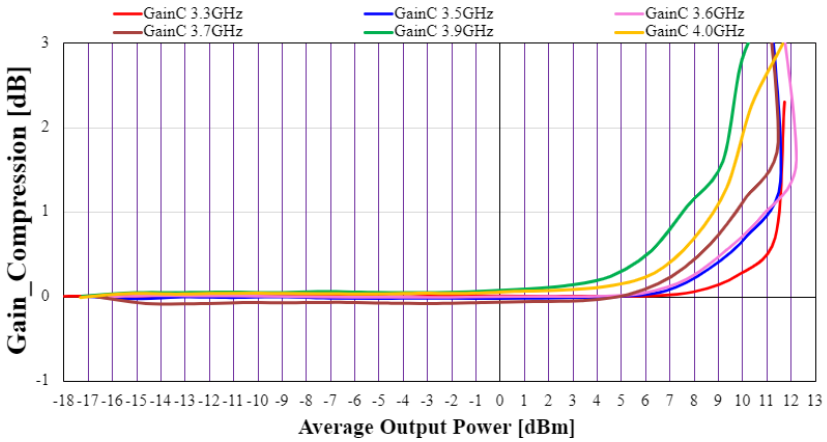

Figure 10 Gain compression Pout of LG mode of TSL8329M-EVB

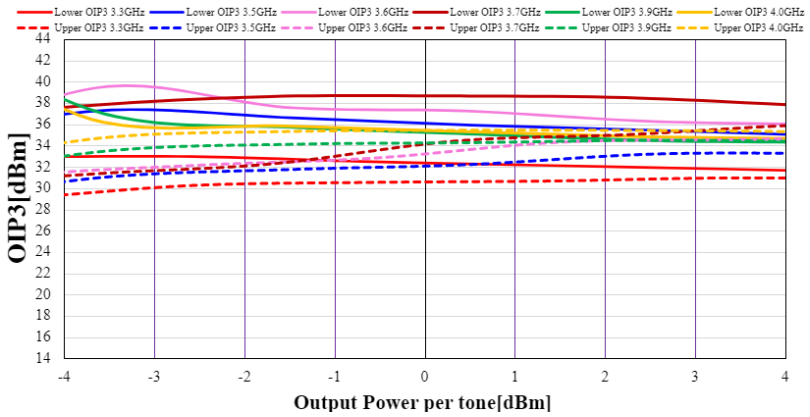

Figure 11 OIP3 Vs Pout per tone of HG mode of TSL8329M-EVB-A

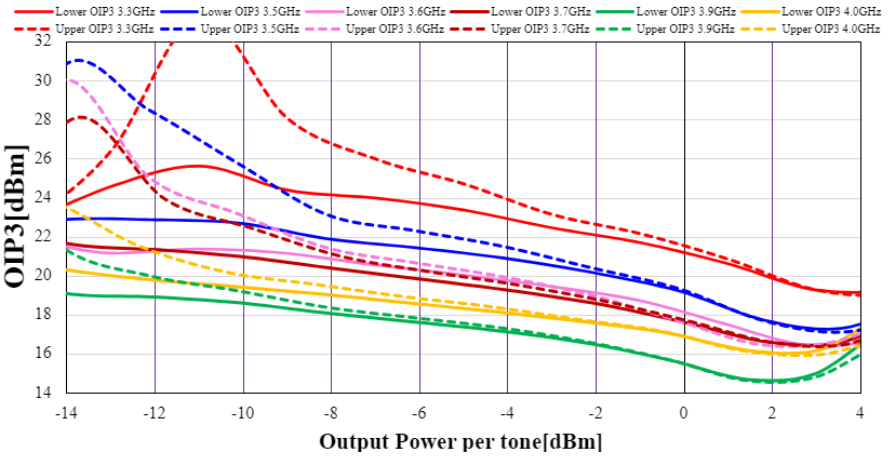

Figure 12 OIP3 Vs Pout per tone of LG mode of TSL8329M-EVB-A