
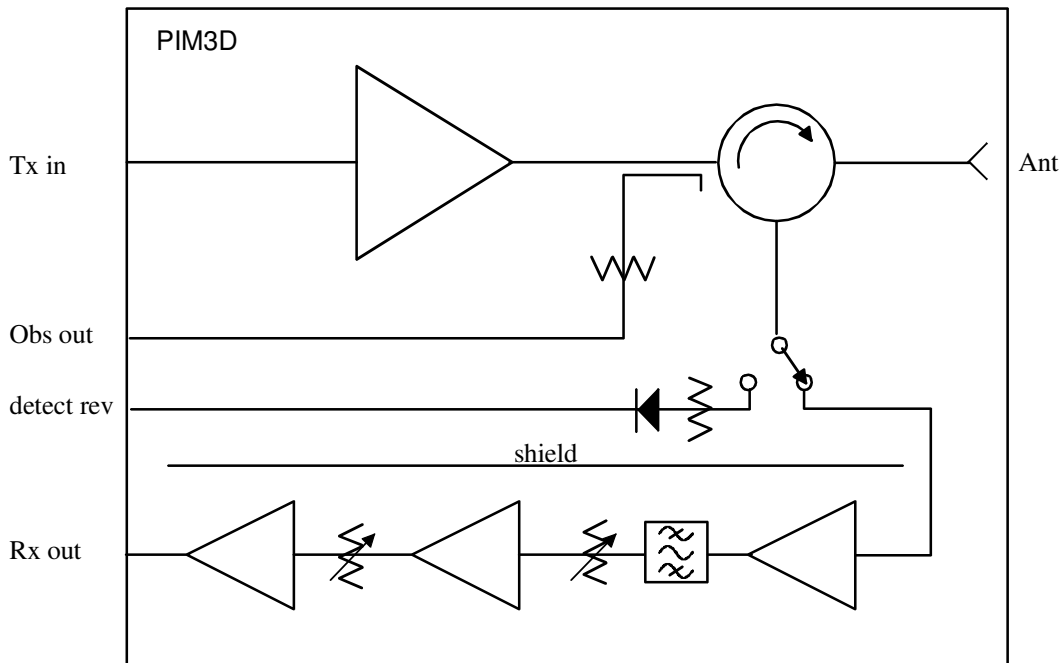


<p>PLUG IN AMPLIFIER MODULES</p>	<p>LPA-PIM3D-050DO-2496M-2690M-T0-02</p>	
<p>P1600</p>		
<p>FEATURES</p> <ul style="list-style-type: none"> ◆ Band 41 (2496-2690MHz) TDD MODULE ◆ <5µs Tx Rx SWITCHING, SINGLE CONTROL <p>Tx :</p> <ul style="list-style-type: none"> ◆ DOHERTY CONFIGURATION, 50W PEAK POWER ◆ 26dB GAIN; 50OHMS INPUT / OUTPUT ◆ 28V/0.4A AT 5W OUTPUT AND 50% DUTY CYCLE ◆ FORWARD OBSERVATION PATH ◆ REVERSE POWER DETECTION <p>Rx :</p> <ul style="list-style-type: none"> ◆ 11-42dB ADJUSTABLE GAIN ◆ NF=2.2dB at 42dB GAIN ◆ IN BAND IIP3= -1 dBm at 42dB GAIN ◆ OUT OF BAND IIP3= +20 dBm (LNA) ◆ 5.5V/0.2A AT 50% DUTY CYCLE 		 <p>PACKAGE : PIM3D-TDD-PCB</p>
		<p>APPLICATIONS</p> <ul style="list-style-type: none"> ◆ RRU - RRH AMPLIFIERS ◆ MIMO AMPLIFIERS

Block diagram:



Transmit electrical characteristics : Supply=28V; Tx-Rx ctrl > 3V; 2496MHz-2690MHz; -20 °C to +75 °C (1,2)

Ref	parameter	conditions	note	min	typ	max	units
1	Bandwidth			2496		2690	MHz
2	Gain Tx with Tx on	2600MHz ; 50°C; Tx -Rx ctrl >3V			26.0		dB
3	Gain flatness	2496-2690MHz	4		0.5	1.0	dBpp
4	Gain vs temperature	2600MHz	4	-2		+2	dB
5	Gain Tx with Rx on	2600MHz ; 50°C; Tx -Rx ctrl <1V			-13		dB
6	Instantaneous bandwidth	F=2600MHz @ 60Wp	3		100		MHz
7	Input return loss	50 ohms			-20	-15	dB
8	Output return loss	50 ohms			-20	-15	dB
9	Fwd Observation path	Tx out to Obs out			-40		dB
10	Fwd Obs accuracy	flatness 2496-2690MHz				0.5	dB
11	Peak envelope power	10 tones peaked phases at -27dBc 1 MHz spacing		50	60		W
12	Adjacent channel power ratio	5W/20MHz LTE signal ACLR1 ACLR2			-33 -45		dBc dBc
13	Forward Intermodulation	2 x 2.5W/10MHz LTE signals			-30		dBc
14	Reverse intermodulation	10W 10MHz forward, 100mW 10MHz reverse				-70	dBc
15	Out of band spurious with one 5W/10MHz signal	1-2360MHz 2402-2472MHz 3400-3800MHz			-38 -28 -58		dBm/MHz
16	Out of band spurious with 2.5W/10MHz 2501MHz and 2.5W/10MHz 2561MHz	2441MHz			-6		dBm/MHz
17	Output noise	2496-2690MHz during Tx			-33		dBm/MHz
18	2d harmonic rejection	1 tone 10W output			TBD		dBc
19	Current consumption Tx with Tx on	28V ; Idle; Tx -Rx ctrl >3V			0.21	0.25	A
20	Current consumption Tx with Tx off	28V; Tx -Rx ctrl <1V			0.01	0.02	A
21	Current consumption	28V ; Tx -Rx ctrl >3V; 1 W-CDMA TM1 64ch ; Pout=6.0Wavg continuous			0.85	1.0	A
22	Current consumption	28V ; Tx -Rx ctrl >3V; 1 W-CDMA TM1 64ch ; Pout=6.0Wavg 50% duty cycle			0.43	0.5	A
23	Tx-Rx Switching level	For Tx on / Rx off		1.6		2.0	V
24	Tx-Rx Switching level	For Rx on / Tx off		0		0.8	V
25	Tx Switching time off-on	Tx -Rx ctrl from 0V to 3V				4	µs
26	Tx Switching time on off	Tx -Rx ctrl from 3V to 0V				3	µs

1. Unless otherwise specified
2. Housing temperature
3. IMD3 dissymmetry 5dB max
4. small signal

Receive electrical characteristics : Supply=5.5V; Tx-Rx ctrl < 0.6V; 2496MHz-2690MHz; -20°C to +75°C (1,2)

Ref	parameter	conditions	note	min	typ	max	units
1	Bandwidth			2496		2690	MHz
2	Max Gain Rx / Rx on	2600MHz ; Tx -Rx ctrl <0.6V; 50°C		40.0	42.0	44.0	dB
3	Gain flatness	2496-2690MHz ; 20dB<Rx Gain<42dB	5		2.0	3.0	dBpp
4	Gain vs temperature	2600MHz		-2		+2	dB
5	Gain Rx / Rx off	2600MHz ; Tx -Rx ctrl >3V; 50°C				0	dB
6	Input return loss	50 ohms			-20	-15	dB
7	Output return loss	50 ohms			-20	-15	dB
8	Noise figure	gain=42dB (ALCRX=0.3V)			2.2	2.5	dB
9	Noise figure	gain=20dB (ALCRX=2.5V)			5.0	6.0	dB
10	IIP3	gain=42dB (ALCRX=0.3V)	6		-2		dBm
11	IIP3	gain=20dB (ALCRX=2.5V)	7		+12		dBm
12	ALCRx for Minimum gain	Gain < 0dB			3.5		V
13	ALC ramp up time	ALCRX from 0.3V to 2.5V	5,8		TBD		µs
14	Current consumption Rx on	Supply 5.5V; Tx -Rx ctrl <0.6V			0.39	0.45	A
15	Current consumption Rx off	Supply 5.5V; Tx -Rx ctrl >3V			0.01	0.02	A
16	Rx Switching time off-on	Tx -Rx ctrl from 3V to 0V	8			4	µs
17	Rx Switching time on-off	Tx -Rx ctrl from 0V to 3V	8			3	µs

5. Adjustment through analog control 0.3V-2.5V

6. 2 tones -35dBm each at input

7. 2 tones -20dBm each at input

8. 0 to 90% level variation

Tx-Rx Switching characteristics : Supplies Tx=28V / Rx=5.5V; -20°C to +75°C (1,2)

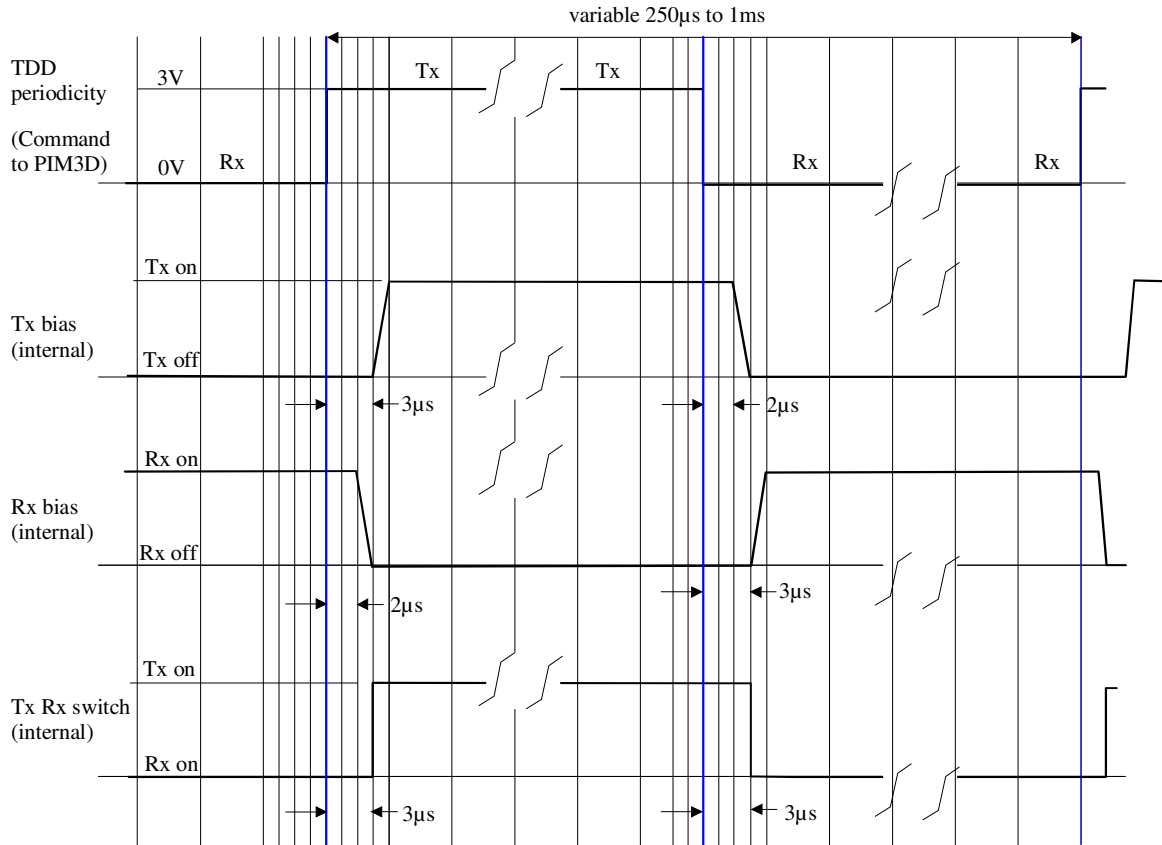
Ref	parameter	conditions	note	min	typ	max	units
1	Tx-Rx Command signal	high		1.6			V
2	Tx-Rx Command signal	low		0		0.8	V
3	Tx-Rx Command signal transition time	Low to high and high to low				0.1	µs
RX TURNS OFF / TX TURNS ON							
4	Delay before Rx turns off		9			2	µs
5	Time to turn Rx off		9			1	µs
6	Delay before Tx turns on		9	3			µs
7	Time to turn Tx on		9			1	µs
TX TURNS OFF / RX TURNS ON							
8	Delay before Tx turns off		10			2	µs
9	Time to turn Tx off		10			1	µs
10	Delay before Rx turns on		10	3			µs
11	Time to turn Rx on		10			1	µs

9. after command signal rising edge

10. after command signal falling edge

TDD INTERNAL SWITCHING :

All internal commands (Tx On/Off, Rx On/Off, TxRx switch) are derived from the TDD periodicity control signal



Maximum ratings

Ref	parameter	conditions	note	min	nom	max	units
1	Operating temperature	Flange temperature		-40°C		+90	°C
2	Tx-Rx control			0		5	V
Transmit max ratings							
2	Supply voltage			0		32	V
3	Input peak power					+23	dBm
4	Input average power					+18	dBm
5	Output VSWR	At 6W output power		∞			-
Receive max ratings							
5	Supply voltage			5.5		8.0	V
6	Max input average power					+15	dBm

Monitoring & Control

Ref	parameter	designation	conditions	Remarks
1	Temperature	TEMP	-40°C to +100°C	I ² C bus
2	Reverse power	Rev detect	Rms 31mV/dB	1W reverse = 0.83V
3	Receive ALC	ALCRX	0.3V to 3.3V / 42dB to 0dB	<10mA
4	Rx to Tx switching	Tx -Rx ctrl	3V ctrl	<3μs switching time
5	Tx to Rx switching	Tx -Rx ctrl	0V ctrl	<3μs switching time
6	Amplifier identity	Id		I ² C bus

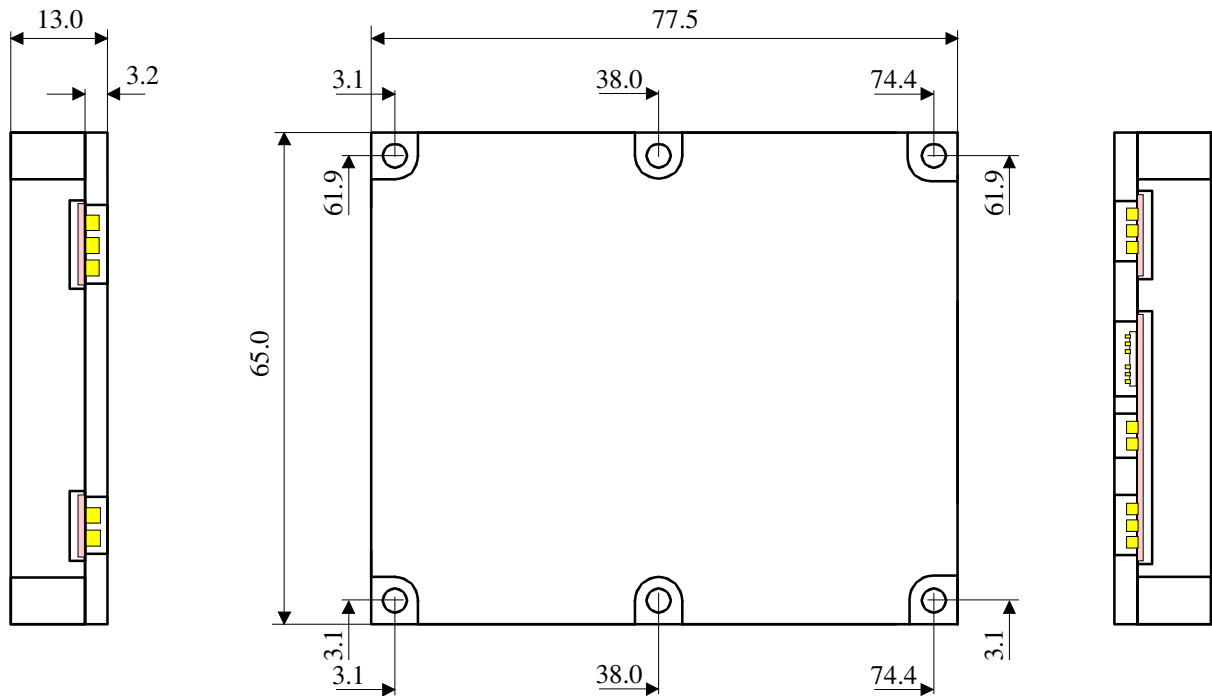
PCB Connections

INPUT PCB (1.6mm +/- 0.2mm Multilayer)	OUTPUT PCB (0.8mm +/-0.1mm Double sided)
Bottom surface of module to input PCB surface :1.6+/- 0.2mm	Bottom surface of module to output PCB surface: 0.8 +/- 0.1mm
Landing pad 1 : RF Gnd (*)	Landing pad 15 : +28V in (***) (alternative to land pad 3)
Landing pad 2 : Tx input (*)	Landing pad 16 : RF Gnd (***)
Landing pad 3 : +28V in (*) (alternative to land pad 15)	Landing pad 17 : Tx output (***)
Landing pad 4 : SCL (**)	Landing pad 18 : Gnd (***)
Landing pad 5 : SDA (**)	Landing pad 19 : Gnd (***)
Landing pad 6: Gnd (**)	
Landing pad 7 : Tx enable(**) (internally connected to 9)	
Landing pad 8 : Rev detect (**)	
Landing pad 9 : Tx enable (**) (internally connected to 7)	
Landing pad 10: RF Gnd (*)	
Landing pad 11 : fwd observation path (*)	
Landing pad 12 : +5.5V in (*)	
Landing pad 13 : Rx Out (*)	
Landing pad 14 : ALCRX (*)	
(*) Harwin S70-220101045R contact pads on input PCB ; 4A max per contact (**) for Molex 78732-6021; 1A max per contact	(***) Harwin S70-125161545R contact pads on output PCB ; 4A max per contact

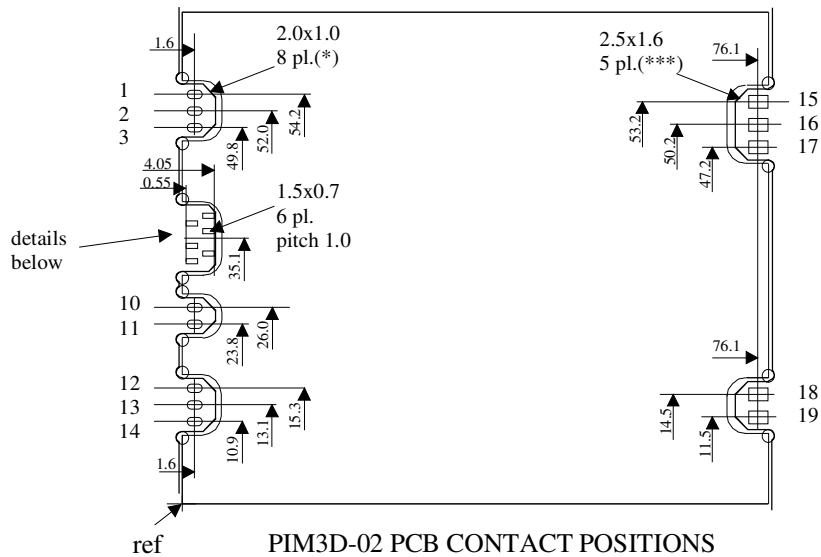
Mechanical

Ref	Characteristic	Description	Remarks
1	Housing size	77.5mm x 65mm x 13.0mm	
2	Mounting	6 M3 screws	
3	Base material	Aluminum 6082	
4	Base finish	Silver	
5	Housing cover finish	Electroless nickel	

PIM3D - TDD - PCB output package outline:



PIM3D landing pads on 1.6 (63mils) thick board at input and 0.8mm (32 mils) thick board at output.

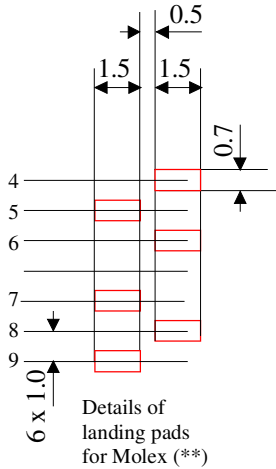


(*) Harwin S70-220101045R
 (***) Harwin S70-125161545R

LPA Concepts

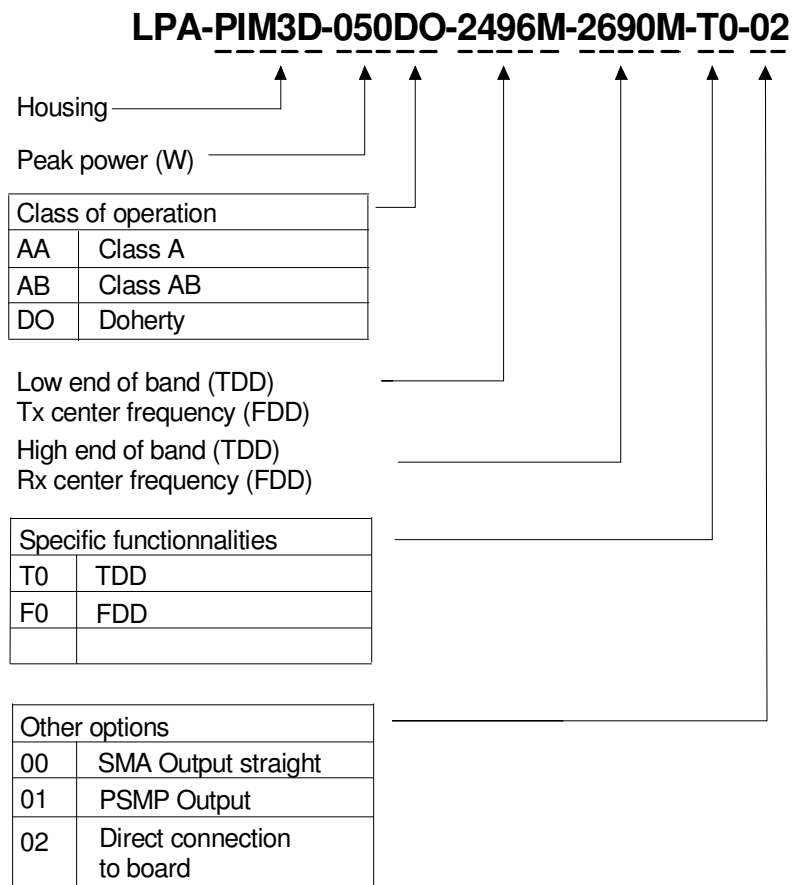
PRELIMINARY

Molex 78732-6021 detail of landing pads:



Note : landing pads for 78732-6021 are gold plated

Part numbering:



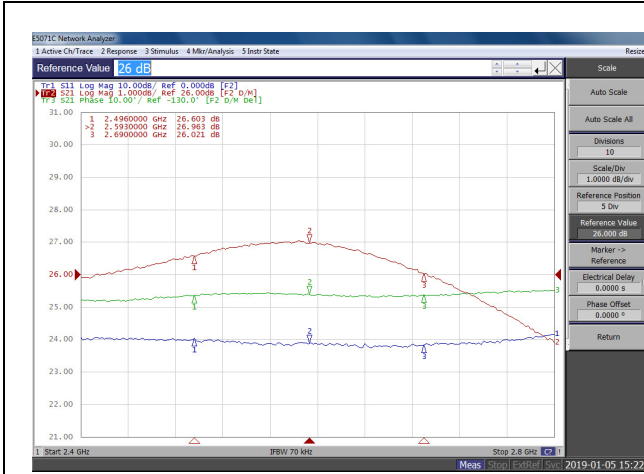
Support documents:

Ref	Document type	Document number	Title	Date
1	Application Note	APNT17001A	PIM3 Module product line	04/2018
2	Application Note	APNT18002B	Using PIM3D modules	12/2018

Related products:

Ref	Part number	Description	Product code
1	TF-PIM3D-50W-TDD-PCB	Test fixture PIM3D PCB output	T110
2	LPA-AH3-05DO-2496M-2690M-T0-00	RF input Band 7 radio head	P1740
3	Radio Demo kit	2Tx-2Rx-1Obs radio board with DPD	

TRANSMIT TYPICAL PERFORMANCE



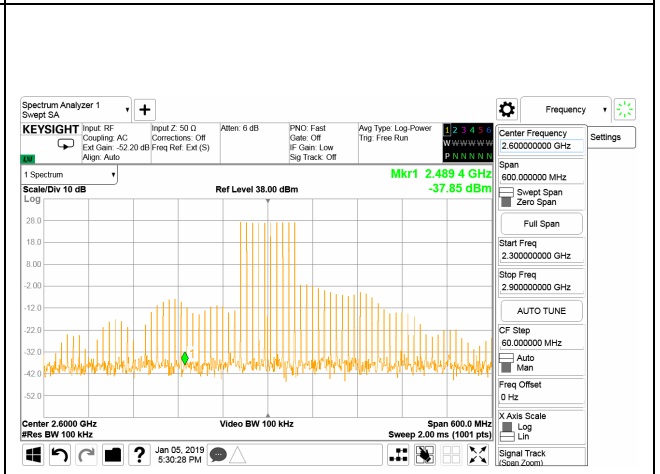
GAIN VS FREQUENCY TX MODE



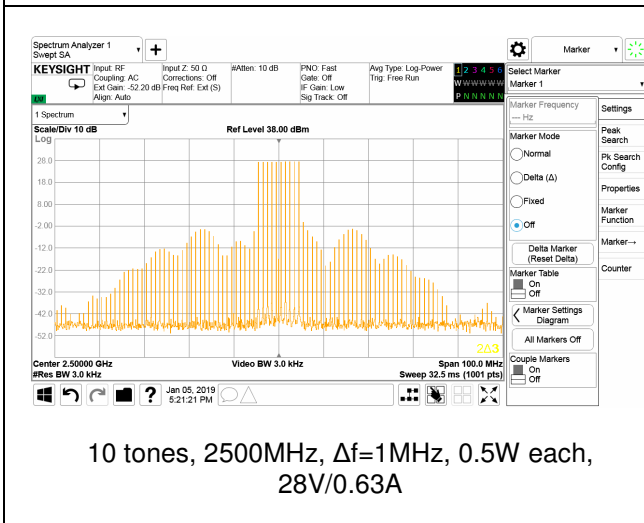
OBSERVATION PATH RELATIVE TO TX OUTPUT



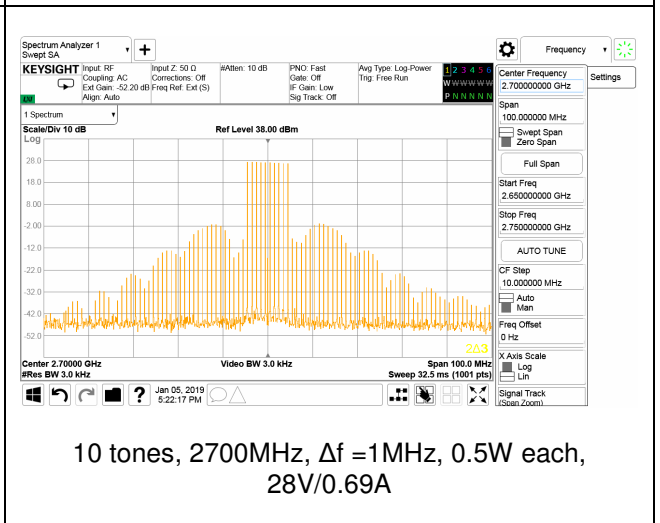
ANTENNA MATCH TX MODE



10 tones, BW=80MHz, flatness over 80MHz

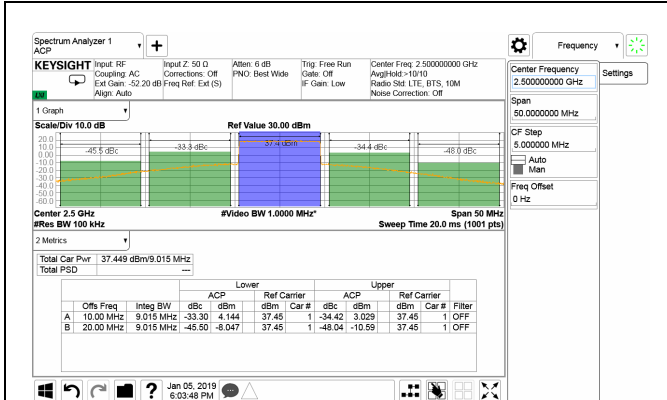


10 tones, 2500MHz, $\Delta f=1$ MHz, 0.5W each, 28V/0.63A

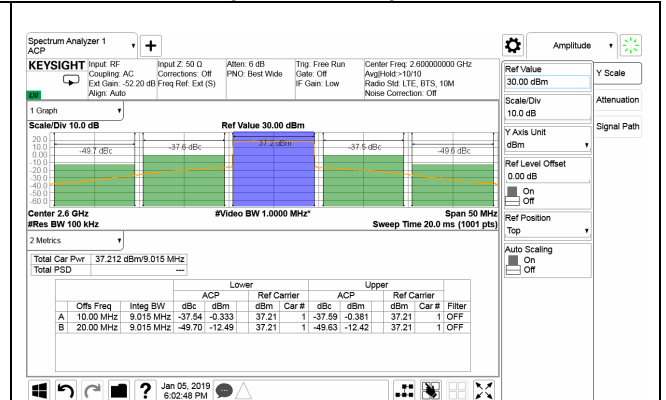


10 tones, 2700MHz, $\Delta f=1$ MHz, 0.5W each, 28V/0.69A

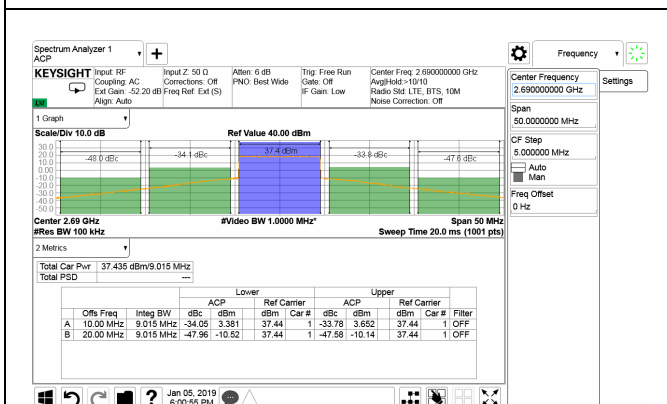
TRANSMIT TYPICAL PERFORMANCE (continued)



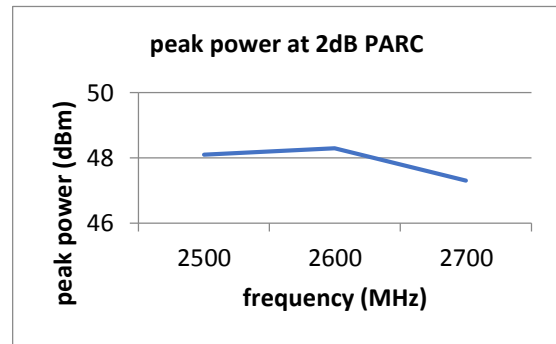
ACLR : 1LTE 10MHz (no CFR) , 2500MHz, 5W, 28V/0.66A



ACLR : 1LTE 10MHz (no CFR) , 2600MHz, 5W, 28V/0.67A

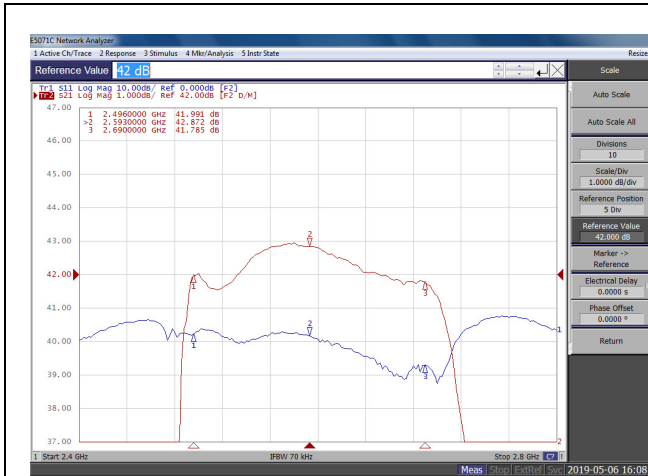


ACLR : 1LTE 10MHz (no CFR) , 2690MHz, 5W, 28V/0.79A

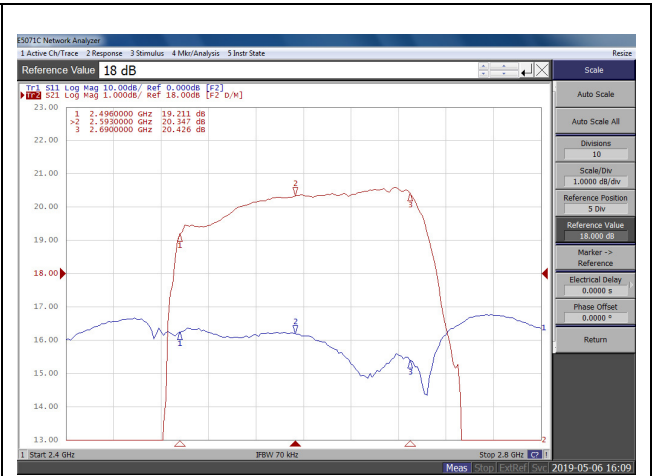


Peak power at 2dB PARC (LTE10M)

RECEIVE TYPICAL PERFORMANCE



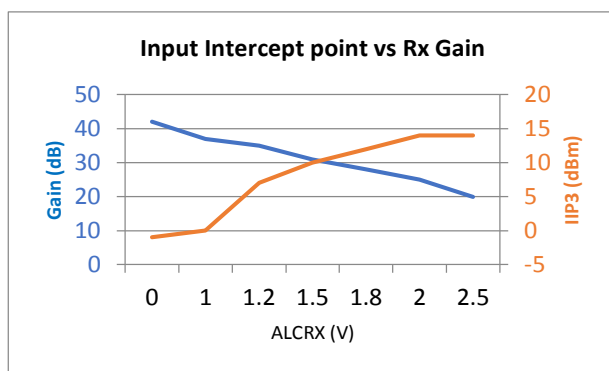
Max GAIN Rx with ALCRX=0.3V



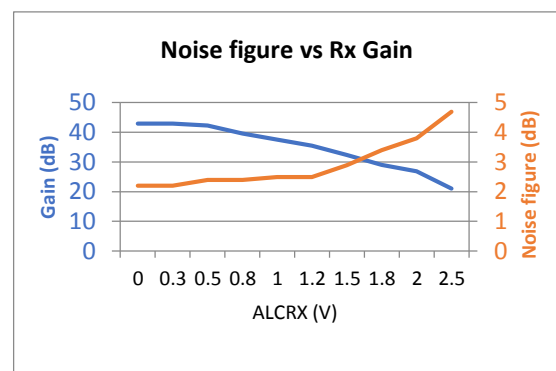
GAIN Rx with ALCRX=2.5V



ANTENNA MATCH Rx mode



Gain & IIP3 vs ALCRX



Gain & Noise figure vs ALCRX

SWITCHING PERFORMANCE

