PLUG IN AMPLIFIER MODULES	LPA-PIM3D-100DO-3400M-3600M-T1-00
P1930	

FEATURES

- ♦ BAND 42 (3400-3600MHz) TDD MODULE
- ♦ 200MHz INSTANTANEOUS BANDWIDTH
- ♦ +48V GAN Tx AMPLIFIER
- ♦ 5µs Tx Rx SWITCHING, SINGLE CONTROL

Tx :

- ♦ DOHERTY CONFIGURATION, 100W PEAK POWER
- ♦ 28dB GAIN; 50OHMS INPUT / OUTPUT
- ♦ +48V/1.1A AT 15W OUTPUT
- ♦ FORWARD / REVERSE OBSERVATION PATH

Rx :

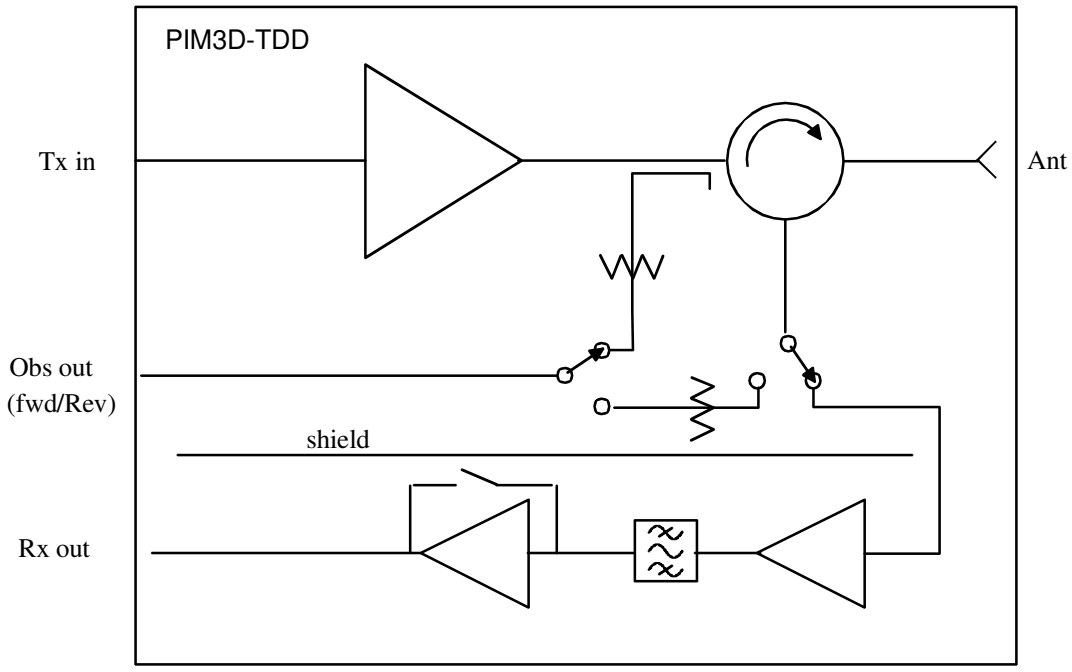
- ♦ 24dB GAIN / 7dB WiTH BYPASS
- ♦ NF=2.5dB at 25dB GAIN
- ♦ IN BAND IIP3= +10dBm AT 25dB GAIN / 5.5V/0.23A
- ♦ IN BAND IIP3= +20dBm AT 7dB GAIN / 5.5V/0.16A

PACKAGE : PIM3D-TDD-MCX

APPLICATIONS

- ♦ RRU - RRH AMPLIFIERS
- ♦ MIMO AMPLIFIERS

Block diagram:



Transmit amplifier biasing :

The Tx amplifier is a GAN amplifier operating from +48V. It requires an auxiliary bias voltage of -8V. There is no particular sequence for applying these 2 voltages. The +48V will be internally switched off if the -8V is not present.

Transmit electrical characteristics: 50 ohms; Supply=+48V; Aux supply=-8V; Tx-Rx ctrl=high; 3400-3600MHz; -20°C to +75°C (1,2)

Ref	parameter	conditions	note	min	typ	max	units
1	Bandwidth			3400		3600	MHz
2	Gain Tx with Tx on	3500MHz ; 50°C; Tx -Rx ctrl = high			28		dB
3	Gain flatness	3400-3600MHz			0.5	1.0	dBpp
4	Gain vs temperature	3500MHz			4		dB
5	Instantaneous bandwidth	f=3500MHz @ 100Wp	4		200		MHz
6	Input return loss	50 ohms			-16		dB
7	Output return loss	50 ohms			-14		dB
8	Fwd Observation path	Tx out to Obs out			-27		dB
9	Fwd Obs accuracy	flatness 2200-2500MHz	5			0.2	dB
10	Peak power	LTE 10MHz TM1.1. PAR=9dB PARC=2dB			100		W
11	AM-PM	LTE 10MHz TM1.1. PAR=9dB PARC=2dB				15	deg.
12	Adjacent channel power ratio	20W/20MHz LTE signal ACLR1 ACLR2	3		 -33 -45		 dBc dBc
13	Output noise	3400-3600MHz during Tx			-33		dBm/MHz
14	2d harmonic rejection	1 tone 10W output			-50		dBc
15	Current consumption Tx	48V ; Idle;			0.15	0.17	A
16	Current consumption Aux supply	-8V			5	10	mA
17	Current consumption Tx with Tx off	48V; Tx enable = low			10		mA
18	Current consumption	48V ; Tx enable = high; 1 LTE 20MHz , PAPR@0.01%=9dB ; Pout=10Wavg continuous			0.76		A
19	Current consumption	48V ; Tx enable = high; 1 LTE 20MHz , PAPR@0.01%=9dB ; Pout=15Wavg continuous			1.1		A
20	Switching time off-on	Tx enable from 0V to 3V			3	4	µs
21	Switching time on off	Tx enable from 3V to 0V			2	3	µs

1. Unless otherwise specified
2. Housing temperature
3. Before correction
4. DPD corrected
5. 50ohms output load

Receive electrical characteristics : 50 ohms; Supply=5.5V; Tx-Rx ctrl = low; 3400-3600MHz; -20°C to +75°C (1,2)

Ref	parameter	conditions	note	min	typ	Max	units
1	Bandwidth			3400		3600	MHz
2	Gain Rx	3500MHz ; 50°C			24		dB
3	Gain flatness	3400-3600MHz			1.0	2.0	dBpp
4	Gain Rx with bypass	3500MHz ; 50°C			7		dB
5	Gain flatness with bypass	3400-3600MHz			1.0	2.0	dBpp
6	Gain vs temperature	3500MHz -20to +75°C max gain			2		dB
7	Input return loss	50 ohms			-16	-14	dB
8	Output return loss	50 ohms			-16	-14	dB
9	Noise figure	gain=24dB			2.5		dB
10	Noise figure	gain=7dB (bypass)			2.5		dB
11	IIP3	gain=24dB	6		+10		dBm
12	IIP3	gain=7dB	7		+20		dBm
13	Current consumption	Supply 5.5V ; Gain=24dB			0.23	0.25	A
14	Current consumption	Supply 5.5V ; Gain=7dB			0.16	0.18	A

6. 2 CW tones at input -30dBm each
7. 2 CW tones at input -20dBm each

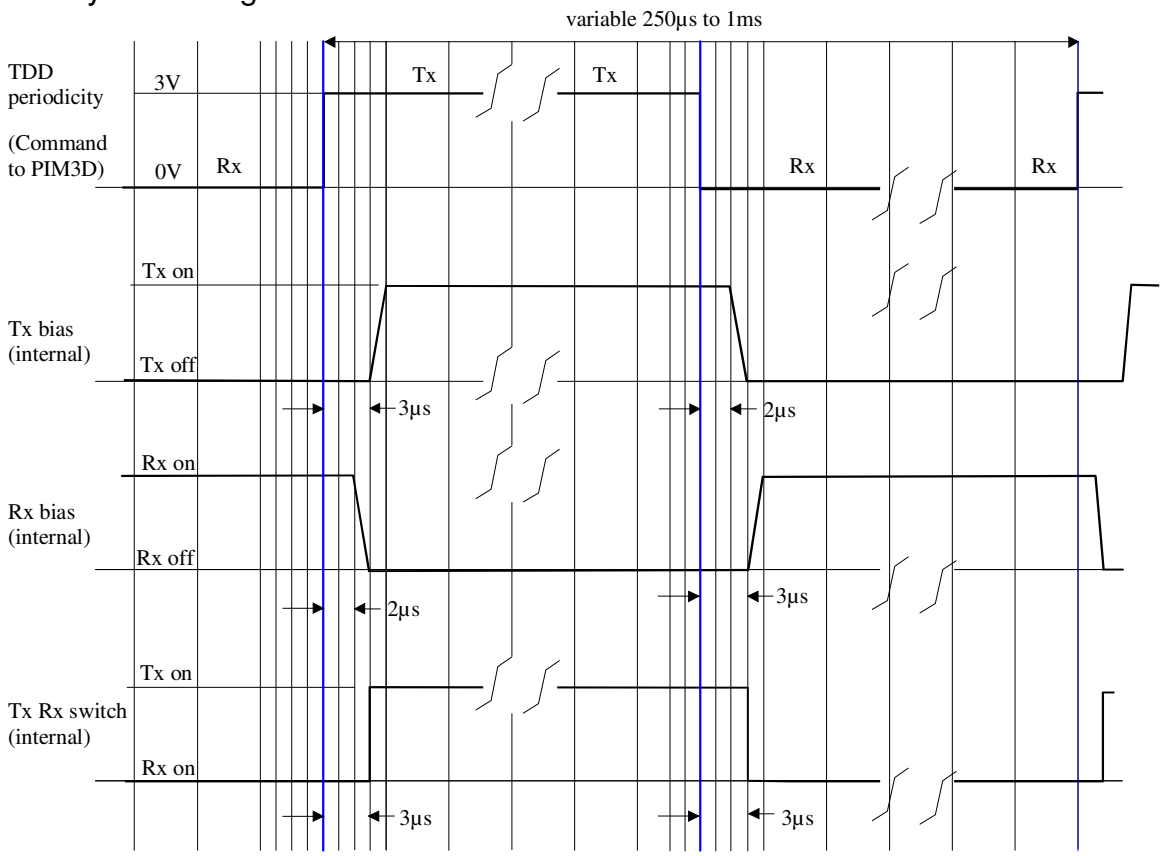
Tx-Rx Switching characteristics: Supplies Tx=48V / Rx=5.5V; -20°C to +75°C (1,2)

Ref	parameter	conditions	note	min	typ	max	units
1	Tx-Rx Command signal	high	8	1.6			V
2	Tx-Rx Command signal	low	9	0		0.6	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		10			2	µs
5	Time to turn Rx off		10			1	µs
6	Delay before Tx turns on		10	3			µs
7	Time to turn Tx on		10			1	µs
TX TURNS OFF / RX TURNS ON							
8	Delay before Tx turns off		11			2	µs
9	Time to turn Tx off		11			1	µs
10	Delay before Rx turns on		11	3			µs
11	Time to turn Rx on		11			1	µs

8. typically switches for Tx-Rx>1.2V
9. typically switches for Tx-Rx<0.8V
10. after command signal rising edge
11. 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
Transmit max ratings							
2	Supply voltage			30V		50	V
3	Input peak power					+15	dBm
4	Input average power					+5	dBm
5	Output VSWR	At 6W ouput power		∞			-
Receive max ratings							
5	Supply voltage			3.0		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	I²C bus
2	Tx Reverse /forward switching	Fwd/rev	0-3.3V	0V= rev 3V=fwd
3	Rx Bypass switching	Byp	0-3.3V	0V=full gain 3V=bypass
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		I²C bus

PCB Connections

INPUT PCB (1.6mm +/- 0.2mm Multilayer)	OUTPUT PCB (1.6mm +/-0.1mm Double sided) (****)
Bottom surface of module to input PCB surface :1.6+/- 0.2mm	Bottom surface of module to output PCB surface: 1.6mm +/- 0.2mm
Landing pad 1 : RF Gnd (*)	Landing pad 15 : +48V in
Landing pad 2 : Tx input (*)	Landing pad 16 : Gnd (***)
Landing pad 3 : -8V aux supply	
Landing pad 4 : SCL (**)	
Landing pad 5 : SDA (**)	
Landing pad 6: Gnd (**)	
Landing pad 7 : TxRx control (**)	
Landing pad 8 : fwd/rev control (**)	
Landing pad 9 : Rx Bypass (**)	
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 : RF Gnd (*)	
(*) Harwin S70-220101045R contact pads on input PCB ; 4A max per contact (**) for Molex 78732-6021; 1A max per contact	(***) Harwin S70- S70-220101045R contact pads on output PCB ; 4A max per contact

Mechanical

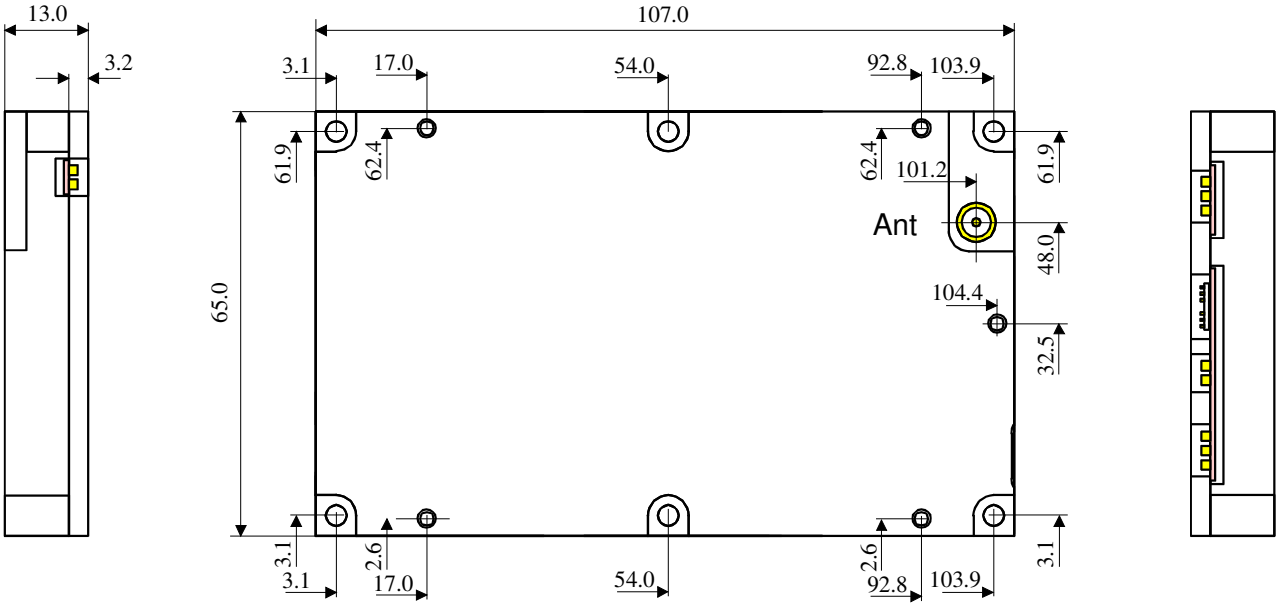
Ref	Characteristic	Description	Remarks
1	Housing size	107.0mm x 65mm x 13.0mm	
2	Mounting	6 M3 screws	
3	Base material	Aluminum 6082	
4	Base finish	Silver	
5	Housing cover finish	Electroless nickel	
6	weigth	150g	

Connectors

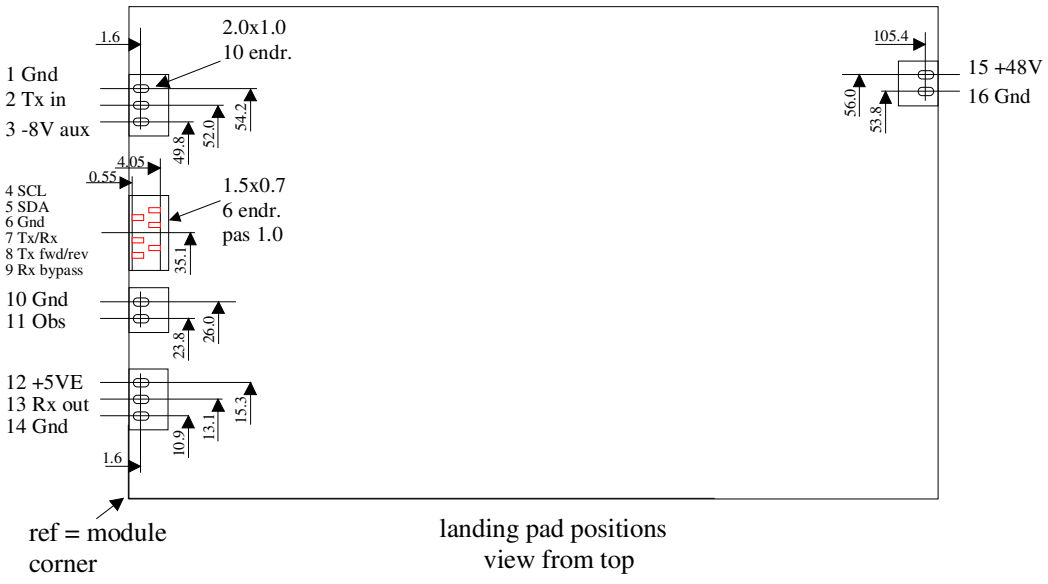
Ref	Characteristic	Description	Remarks
1	RF input/samples connectors	Spring contacts	Connects to 1.6mm multilayer board (*)
2	Antenna connector	MCX	
3	DC Supply connectors	Spring contacts	Connects to 1.6mm multilayer board (*)
4	Signal connectors	Molex 78732-6021	Connects to 1.6mm multilayer board (**)

(*) with gold plated tabs Harwin S70-220101045R
(**) direct connection to PCB

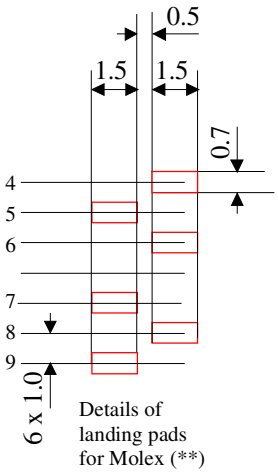
PIM3D - TDD - MCX package outline:



PIM3D landing pads on 1.6 (63mils) thick board:

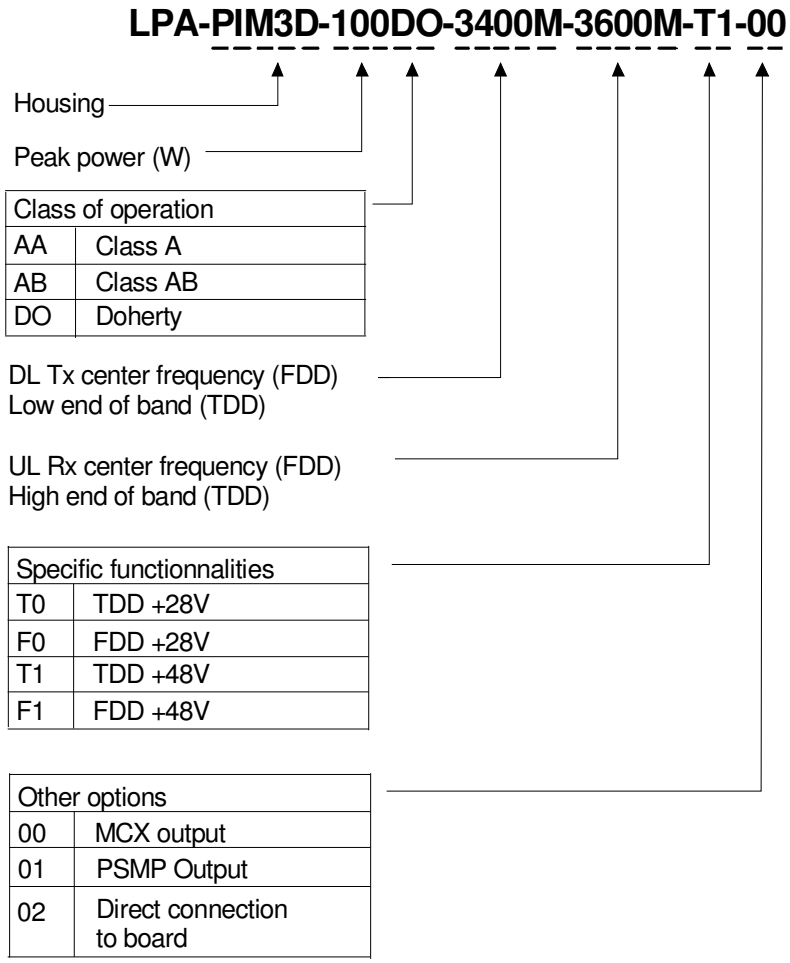


Molex 78732-6021 detail of landing pads:



Note : landing pads for 78732-6021 are gold plated

Part numbering:



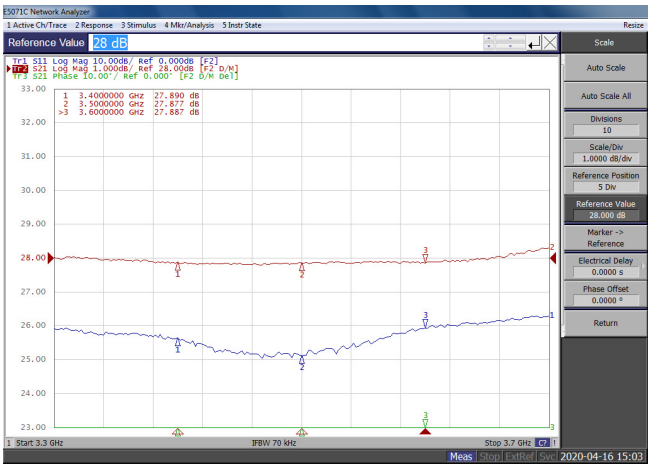
Support documents:

Ref	Document type	Document number	Title	Date
1	Application Note	APNT17001A	PIM3 Module product line	04/2018
2	Application Note	APNT18002	Using PIM3D modules	05/2018

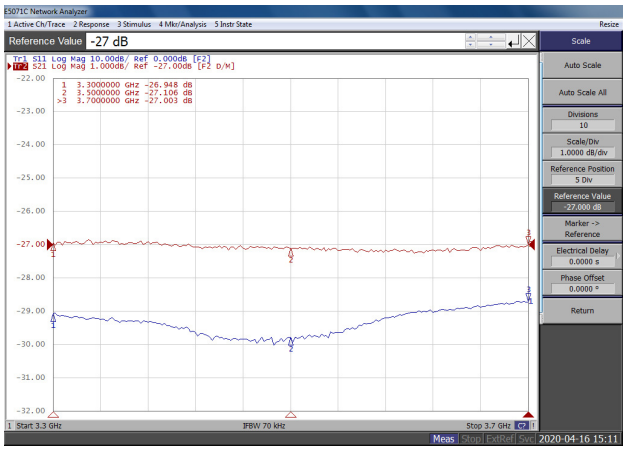
Related products:

Ref	Part number	Description	Product code
1	TF-PIM3D-GAN-150W-MCX	Test fixture PIM3D GAN MCX/PSMP	T200
2	TF-PIM3D-INTERFACE02	I2C-USB interface board	T190

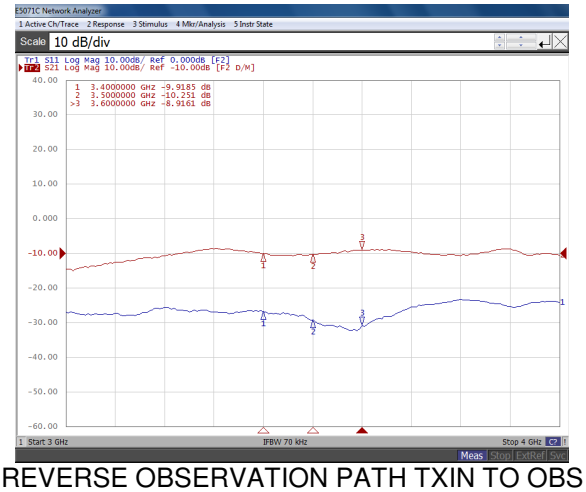
TRANSMIT TYPICAL PERFORMANCE



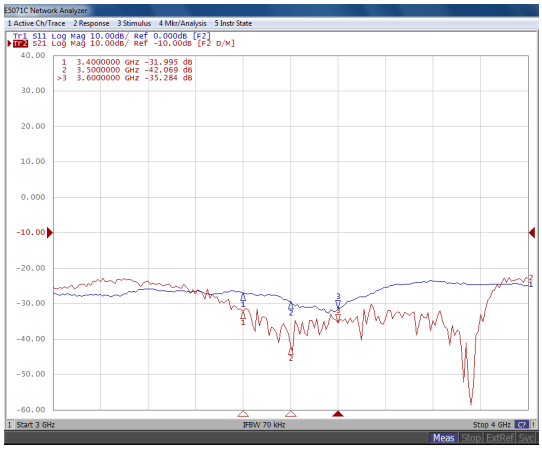
TX GAIN VS FREQUENCY



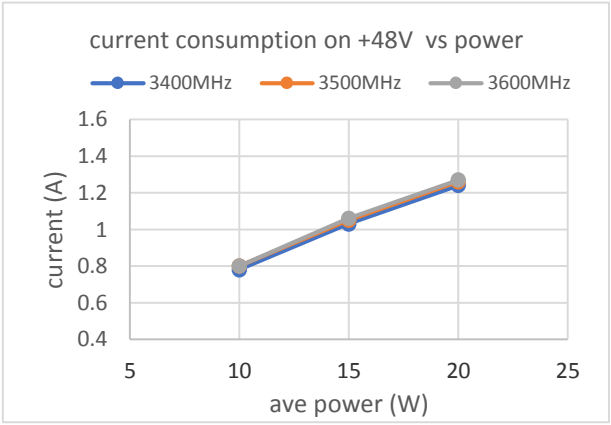
FORWARD OBSERVATION PATH OBS OUT RELATIVE TO RF OUT



REVERSE OBSERVATION PATH TXIN TO OBS OUT (OUTPUT OPEN)

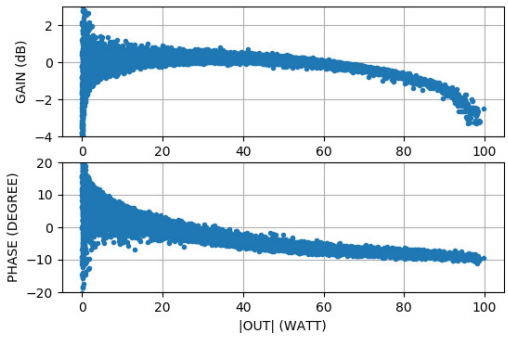


REVERSE OBSERVATION PATH TXIN TO OBS OUT (OUTPUT LOADED)

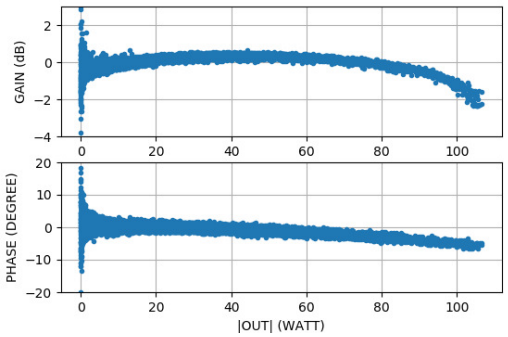


Current consumption on +48V vs output power
1LTE 20MHz signal ($PAPR_{@0.01\%}$=9dB)

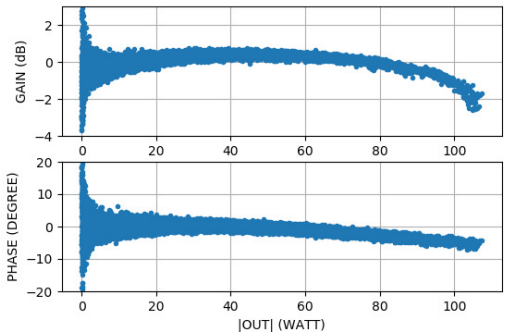
TRANSMIT TYPICAL PERFORMANCE (continued)



AM-AM and AM-PM; 3400MHz
LTE 20MHz PAR=9dB



AM-AM and AM-PM; 3500MHz
LTE 20MHz PAR=9dB



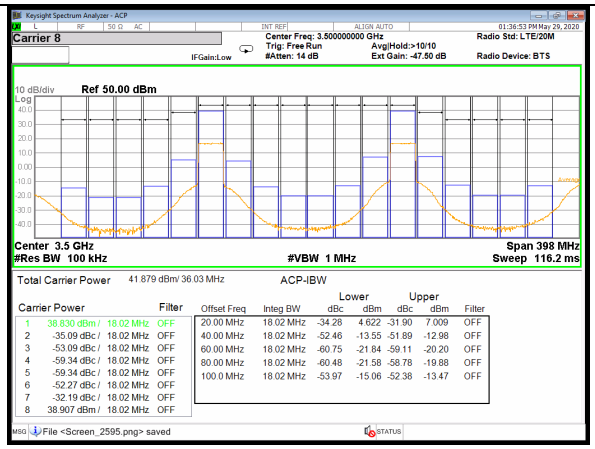
AM-AM and AM-PM; 3600MHz
LTE 20MHz PAR=9dB

ACLR LTE20MHz PAR=9dB 3400MHz 10W
48V/0.76A

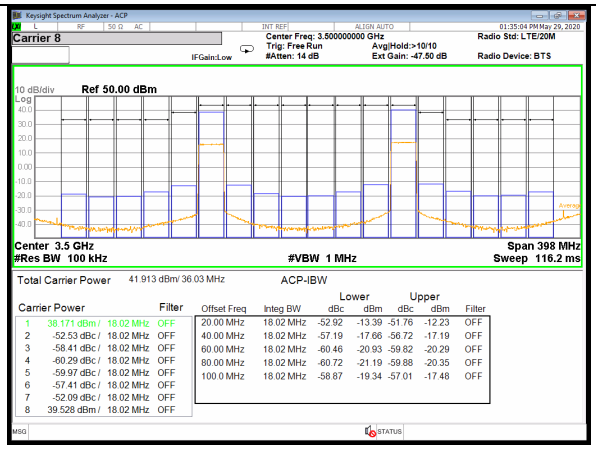
ACLR LTE20MHz PAR=9dB 3500MHz 10W
48V/0.82A

ACLR LTE20MHz PAR=9dB 3600MHz 10W
48V/0.81A

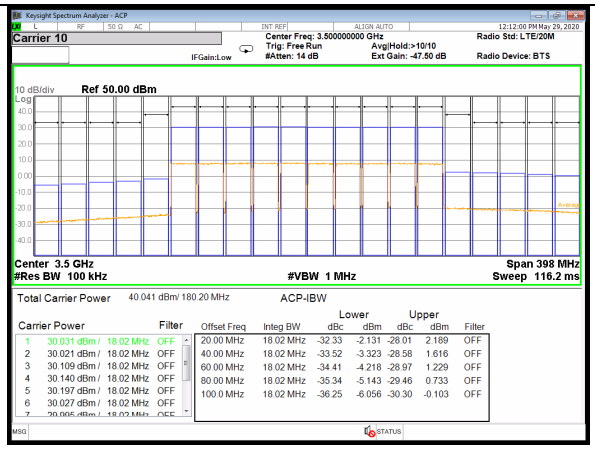
TRANSMIT TYPICAL PERFORMANCE (continued)



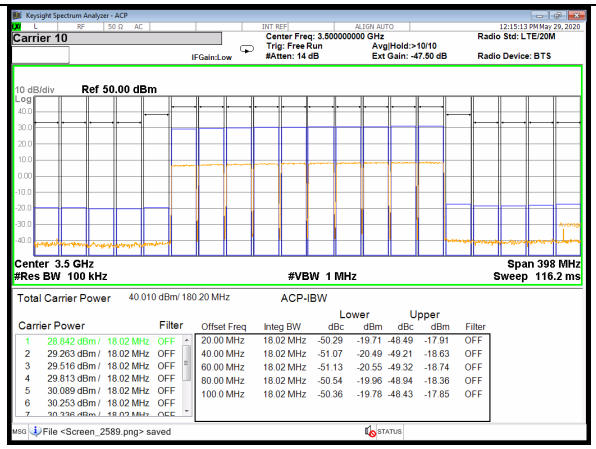
2 carriers 20MHz each spaced by 140MHz PARin=9dB 3500MHz 15W/48V/1.1A without linearization



2 carriers 20MHz each spaced by 140MHz PARin=9dB 3500MHz 15W/48V/1.1A with linearization

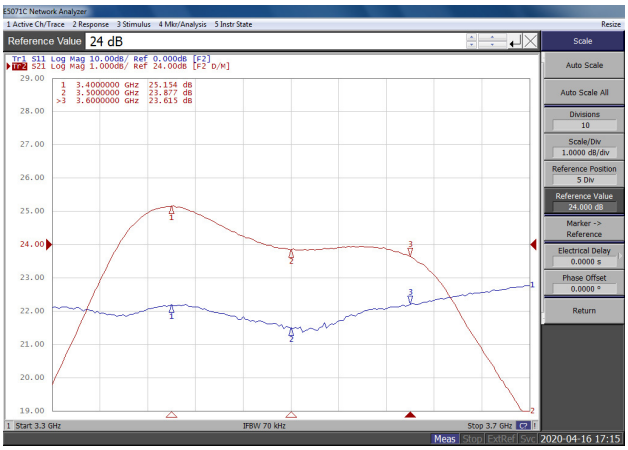


10 carriers 20MHz each, PARin=9dB 3500MHz 10W/48V/0.81A without linearization

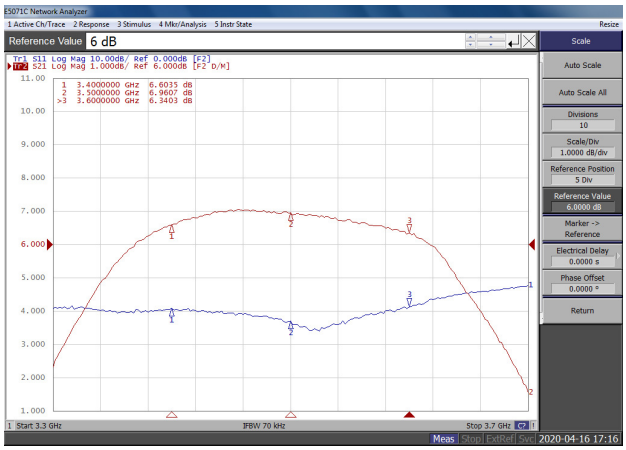


10 carriers 20MHz each, PARin=9dB 3500MHz 10W/48V/0.81A with linearization

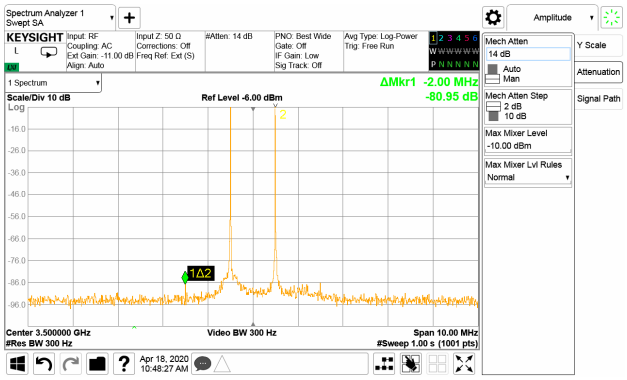
RECEIVE TYPICAL PERFORMANCE



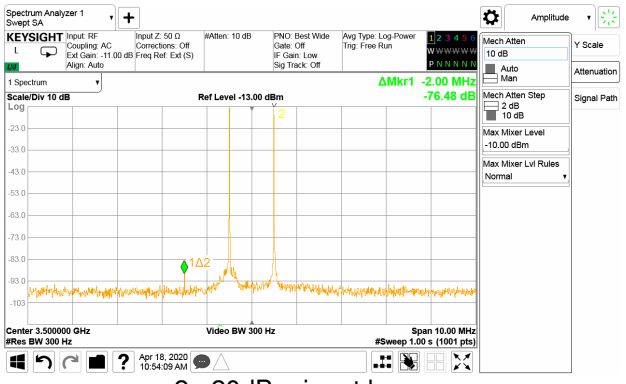
GAIN Rx +5.5V/230mA



GAIN Rx with bypass +5.5V/160mA



2x-30dBm input full gain



2x-20dBm input bypass