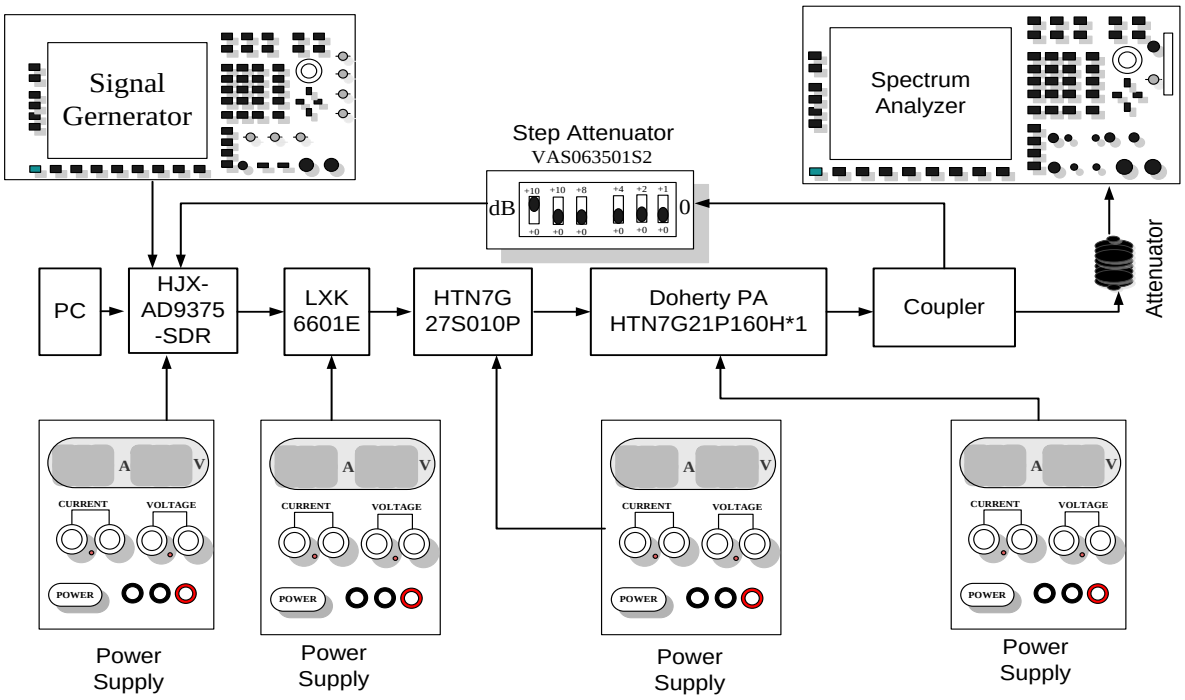
HJX-AD9375-SDR/ HTN7G21P160H TEST REPORT

RF Transceiver	AD9375
Power Amplifier	HTN7G21P160H
PA Type	Symmetrical Doherty
Transistor Type	LDMOS
Operating Frequency Range (MHz)	1805-1880 / 2110-2170
Gain (dB)	14@1.8G / 15@2.1G
Power Added Efficiency	32%@42dBm@1.8G / 29%@42dBm@2.1G
P1dB (dBm)	50@1.8G / 52@2.1G
Supply Voltage	28V
Bandwidths Tested	20MHz

TEST BLOCK DIAGRAM



BLOCK DIAGRAM

Block diagram of system including Doherty PA HTN7G21P160H , drivers LXK6601E &HTN7G27S010P , coupler , supply voltages, drain currents, attenuators, Observation path rms input power level @ Peak power. AD9375 DPD configuration used – if common across all plots then these can be detailed here and not repeated across each plot.

VENDOR LIST

Device	Part Number	Vendor	Website
AD9375 SDR	HJX-AD9375-SDR	HJX	http://www.hjx.cn/en/index.php?m=content&c=index&a=show&catid=32&id=14
Final PA	HTN7G21P160H	Huatai	http://en.huatai-elec.com/
Driver PA	HTN7G27S010P		
Gain Block	LXK6601E	Creotech	http://www.creotechco.com/index.php?lang=en
Step Attenuator	VAS063501S2	Yantel	http://www.yantel-corp.com/en/home/index.html
3dB Hybrid Couple	HC1900P03		

AD9375 DPD CONFIGURATION

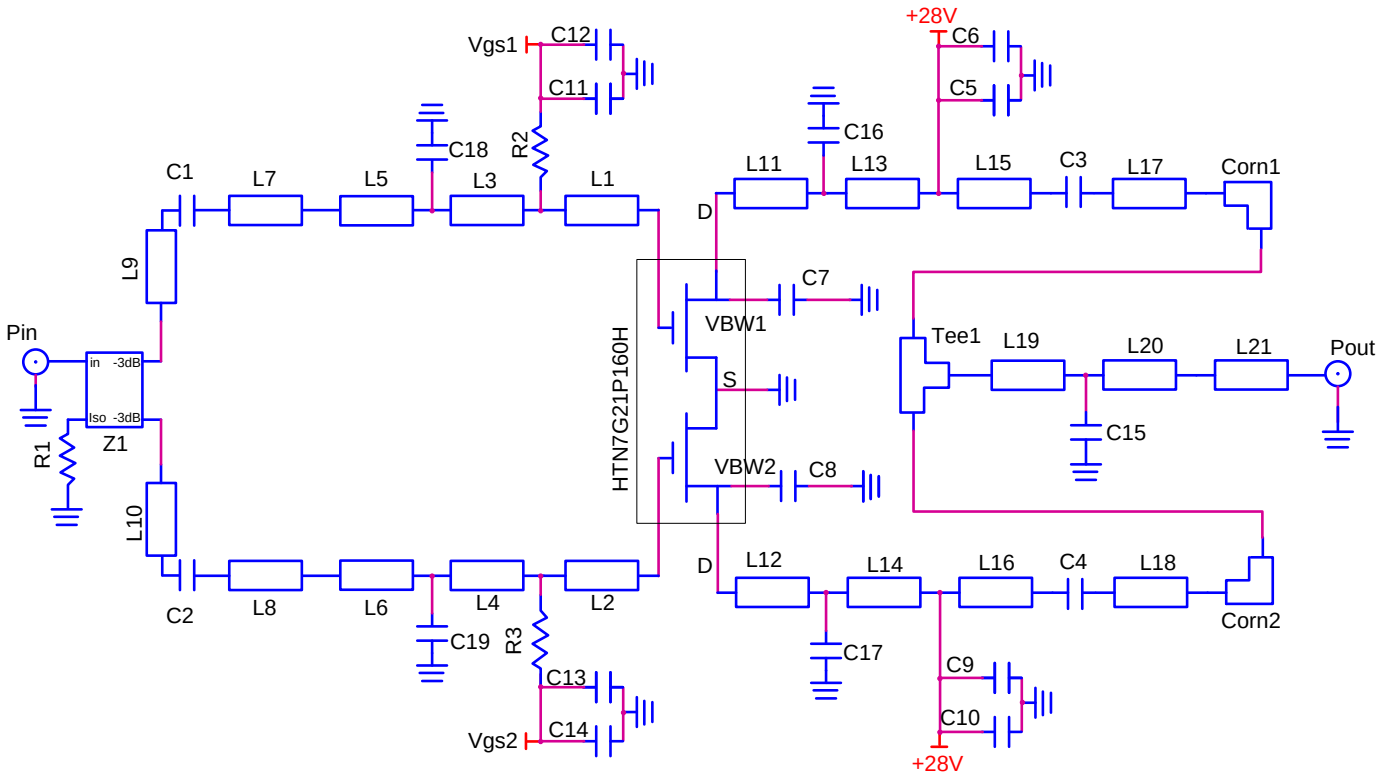
Capture all DPD settings used for plot

SOFTWARE VERSION: MYK_2048
API VERSION: V3528

```
static mykonosDpdConfig_t dpdConfig =
{
    10, /* 1/2^(damping + 8) fraction of power `forgotten' per sample (default: `1/8192' = 5, valid 0 to 15), 0 = infinite damping*/
    2, /* number of weights to use for int8_cpx weights weights member of this structure (default = 1)*/
    2, /* DPD model version: one of four different generalized polynomial models: 0 = same as R0 silicon, 1-3 are new and the best one depends on the PA (default: 2)*/
    1, /* 1 = Update saved model whenever peak Tx digital RMS is within 1dB of historical peak Tx RMS*/
    20, /* Determines how much weight the loaded prior model has on DPD modeling (Valid 0 - 32, default 20)*/
    1, /* Default off = 0, 1=enables automatic outlier removal during DPD modeling */
    512, /* Number of samples to capture (default: 512, valid 64-32768)*/
    4096, /* threshold for sample in AM-AM plot outside of 1:1 line to be thrown out. (default: 50% = 8192/2, valid 8192 to 1)*/
    -2, /* 16th of an ORx sample (16=1sample), (default 0, valid -64 to 64)*/
    255, /* Default 255 (-30dBFs=(20Log10(value/8192)), (valid range   1 to 8191)*/
    {{0,0},{-64,0},{0,0}}/* DPD model error weighting (real/imag valid from -128 to 127)*/
};
```

HTN7G21P160H APPLICATION CIRCUIT

Component	Description		Component	Description
C1, C2, C3, C4, C5, C9, C11, C13	10pF@1800MHz	10pF@2100MHz	L9	（W×L）1.1mm×11.31mm
C6, C7, C8, C10, C11, C14	10uF@1800MHz	10uF@2100MHz	L10	（W×L）1.1mm×18.24mm
C15	0.3pF@1800MHz	0.5pF@2100MHz	L11, L12	（W×L）7.5mm×4.48mm
C16,C17	3.3pF@1800MHz	3.0 pF@2100MHz	L13, L14	（W×L）7.5mm×3.22mm
C18,C19	3.3pF@1800MHz	2.7pF@2100MHz	L15, L16	（W×L）1.1mm×11.58mm
R1	50Ω Resistor		L17	（W×L）1.1mm×11.06mm
R2,R3	10Ω Resistor		L18	（W×L）1.1mm×30.26mm
Z1	1700-2000MHz Band, 90º, 3dB Hybrid		L19	（W×L）1.95mm×17.34mm
L1,L2	（W×L）7mm×2.56mm		L20	（W×L）1.95mm×3.43mm
L3,L4	（W×L）7mm×1.85mm		L21	（W×L）1.1mm×19.24mm
L5,L6	（W×L）7mm×2.93mm		Corn1, Corn2	（W）1.1mm
L7,L8	（W×L）1.1mm×4.5mm		Tee1	（W1×W2×W3）1.1mm×1.1mm×1.95mm



ACPR RESULTS BOTTOM/MIDDLE/TOP FREQUENCIES

1805MHZ, 20MHZ BANDWIDTH ACPR RESULTS

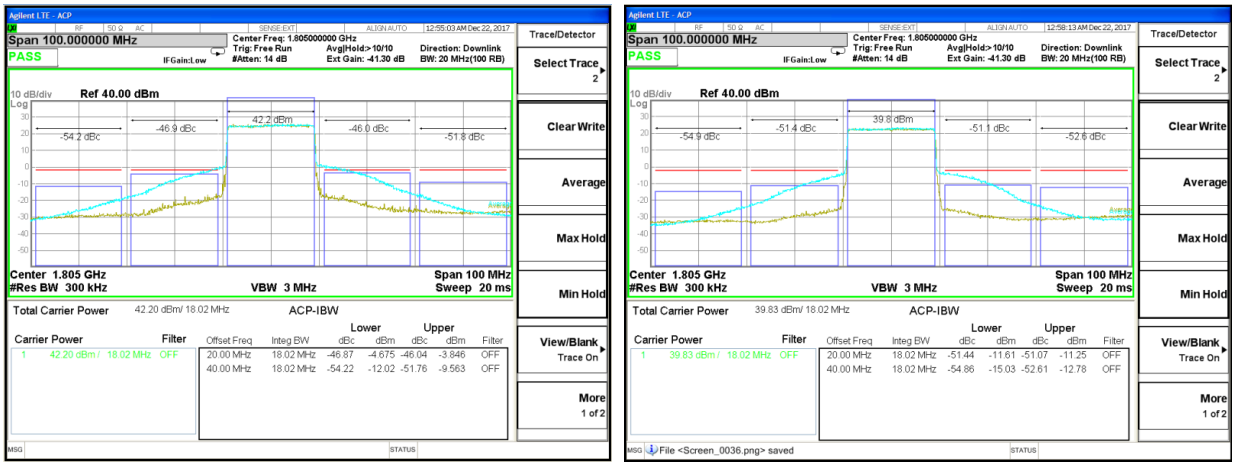


*Figure 1. 20MHz FDDTM1.1.WFM **PAR=10dB**@0.01% probability on the CCDF Signal, Pout 42&40dBm,showing spectrum analyzer plots before&after DPD*

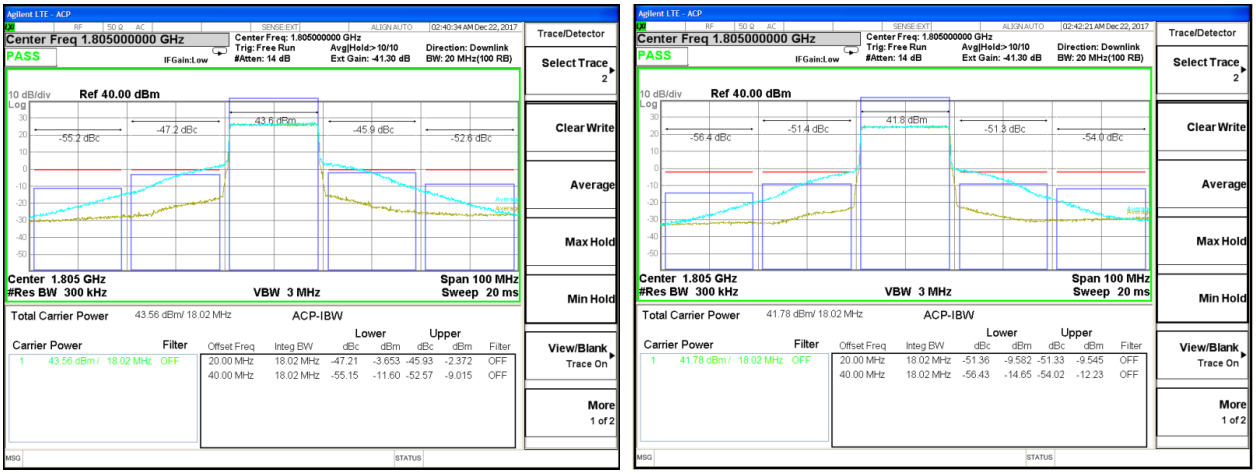


*Figure 2. 20MHz FDDTM1.1.WFM **PAR=8dB**@0.01% probability on the CCDF Signal, Pout 44&42dBm,showing spectrum analyzer plots before&after DPD*

Signal		Pout/dBm	ACPR-1/dBc	ACPR+1/dBc	ACPR-2/dBc	ACPR+2/dBc	Id/A	PAE (%)
PAR=10dB@0.01% probability on the CCDF	**Before DPD**	42.3	-31.0	-28.9	-49.2	-47.8	1.96	30.9%
	After DPD	42.2	-46.9	-46.0	-54.2	-51.8	1.93	30.7%
	Before DPD	40.0	-33.4	-31.2	-52.4	-51.2	1.51	23.7%
	After DPD	39.8	-51.4	-51.1	-54.9	-52.6	1.49	22.9%
PAR=8dB @0.01% probability on the CCDF	**Before DPD**	43.9	-29.0	-27.5	-46.3	-44.7	2.40	36.5%
	After DPD	43.6	-47.2	-45.9	-55.2	-52.6	2.38	34.4%
	Before DPD	42.0	-31.1	-29.6	-49.7	-49.0	1.91	29.6%
	After DPD	41.8	-51.4	-51.3	-56.4	-54.0	1.90	28.5%

Table 1. Summary of Results: Frequency: 1805MHz, 20MHZ FDDTM1.1.WFM Signal

PA settings: Drain Voltage 28V , Auxiliary Amplifier Bias Voltages 0.7V, Total Bias currents 520mA

1840MHZ, 20MHZ BANDWIDTH ACPR RESULTS

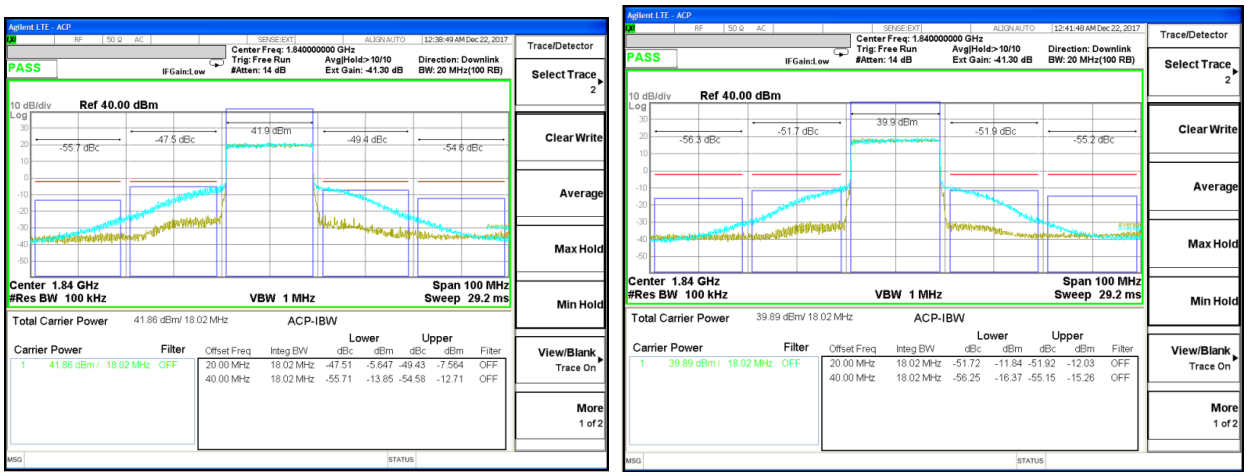


*Figure 3. 20MHz FDDTM1.1.WFM **PAR=10dB**@0.01% probability on the CCDF Signal, Pout 42&40dBm,showing spectrum analyzer plots before&after DPD*

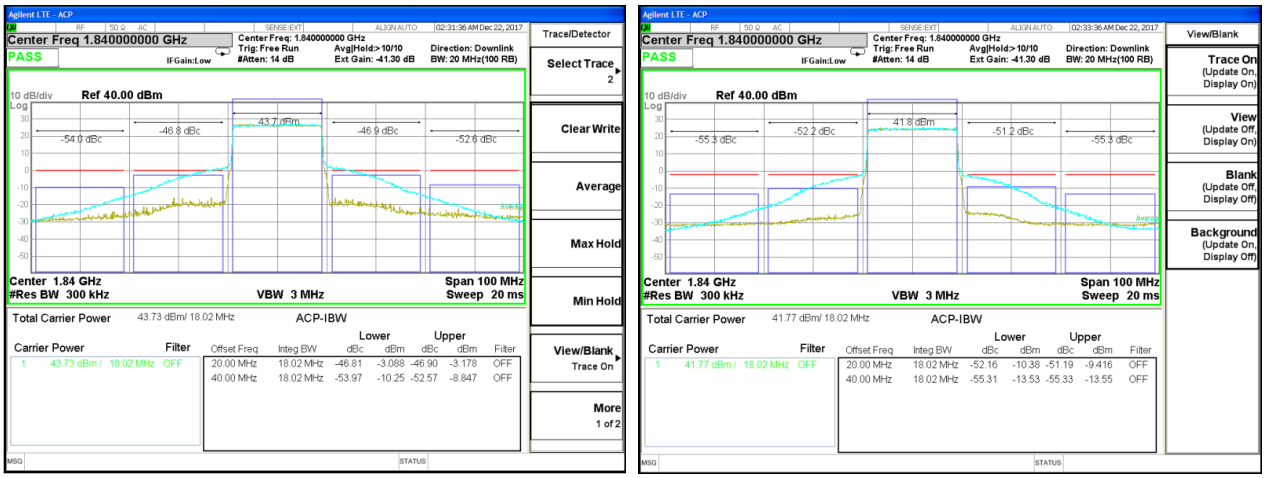


*Figure 4. 20MHz FDDTM1.1.WFM **PAR=8dB**@0.01% probability on the CCDF Signal, Pout 44&42dBm,showing spectrum analyzer plots before&after DPD*

Signal		Pout/dBm	ACPR-1/dBc	ACPR+1/dBc	ACPR-2/dBc	ACPR+2/dBc	Id/A	PAE (%)
PAR=10dB@0.01% probability on the CCDF	**Before DPD**	42.0	-31.2	-30.5	-50.5	-50.5	1.74	32.5%
	After DPD	41.9	-47.5	-49.4	-55.7	-54.6	1.72	32.2%
	Before DPD	39.9	-33.8	-32.9	-54.0	-53.9	1.36	25.7%
	After DPD	39.9	-51.7	-51.9	-56.3	-55.2	1.36	25.7%
PAR=8dB @0.01% probability on the CCDF	**Before DPD**	44.0	-29.3	-29.0	-47.1	-47.3	2.28	39.3%
	After DPD	43.7	-46.8	-46.9	-54.0	-52.6	2.25	37.2%
	Before DPD	41.9	-32.0	-31.7	-51.7	-52.6	1.70	32.5%
	After DPD	41.8	-52.2	-51.2	-55.3	-55.3	1.69	32.0%

Table 2. Summary of Results: Frequency: 1840MHz, 20MHZ FDDTM1.1.WFM Signal

PA settings: Drain Voltage 28V , Auxiliary Amplifier Bias Voltages 0.7V, Total Bias currents 520mA

1880MHZ, 20MHZ BANDWIDTH ACPR RESULTS

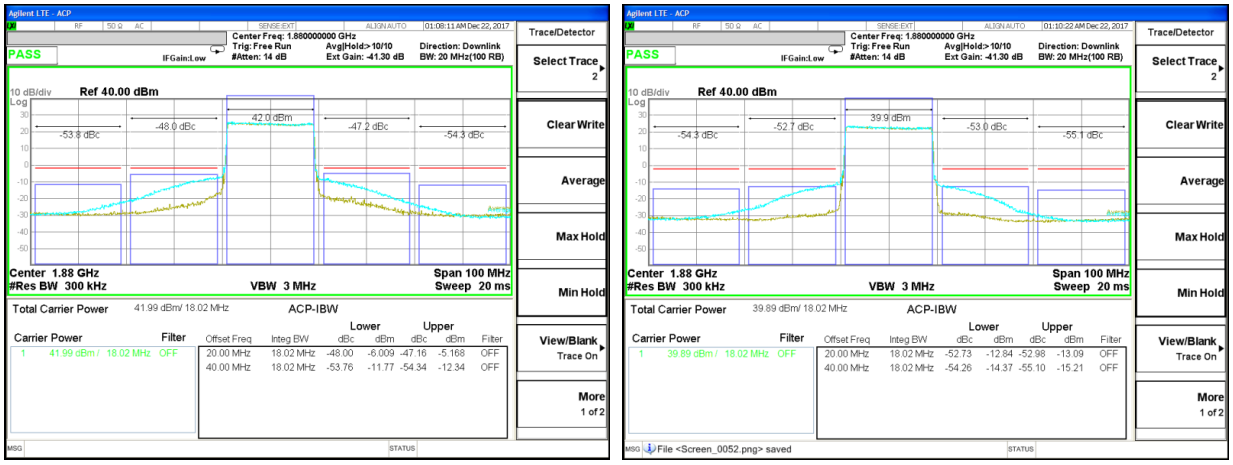


*Figure 5. 20MHz FDDTM1.1.WFM **PAR=10dB**@0.01% probability on the CCDF Signal, Pout 42&40dBm,showing spectrum analyzer plots before&after DPD*

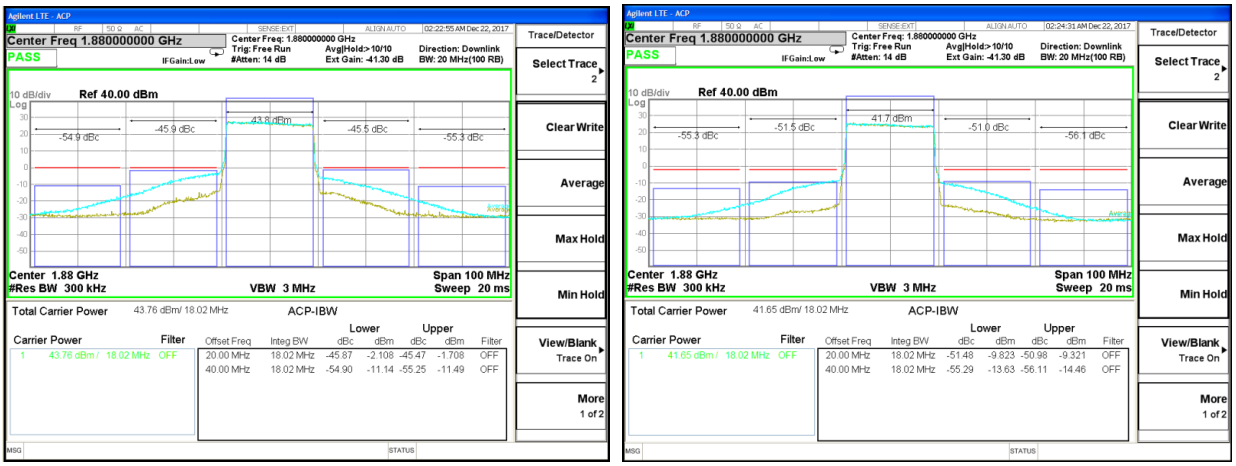


*Figure 6. 20MHz FDDTM1.1.WFM **PAR=8dB**@0.01% probability on the CCDF Signal, Pout 44&42dBm,showing spectrum analyzer plots before&after DPD*

Signal		Pout/dBm	ACPR-1/dBc	ACPR+1/dBc	ACPR-2/dBc	ACPR+2/dBc	Id/A	PAE (%)
PAR=10dB@0.01% probability on the CCDF	**Before DPD**	42.2	-36.4	-37.8	-51.2	-53.4	1.85	32.0%
	After DPD	42.0	-48.0	-47.2	-53.8	-54.3	1.81	31.3%
	Before DPD	40.1	-38.5	-39.5	-53.0	-55.1	1.45	25.2%
	After DPD	39.9	-52.7	-53.0	-54.3	-55.1	1.41	24.8%
PAR=8dB @0.01% probability on the CCDF	**Before DPD**	43.9	-34.0	-36.6	-49.3	-51.6	2.33	37.6%
	After DPD	43.8	-45.9	-45.5	-54.9	-55.3	2.30	37.2%
	Before DPD	41.8	-37.1	-38.8	-52.1	-54.7	1.77	30.5%
	After DPD	41.7	-51.5	-51.0	-55.3	-56.1	1.73	30.5%

Table 3. Summary of Results: Frequency: 1880MHz, 20MHZ FDDTM1.1.WFM Signal

PA settings: Drain Voltage 28V , Auxiliary Amplifier Bias Voltages 0.7V, Total Bias currents 520mA

2110MHZ, 20MHZ BANDWIDTH ACPR RESULTS

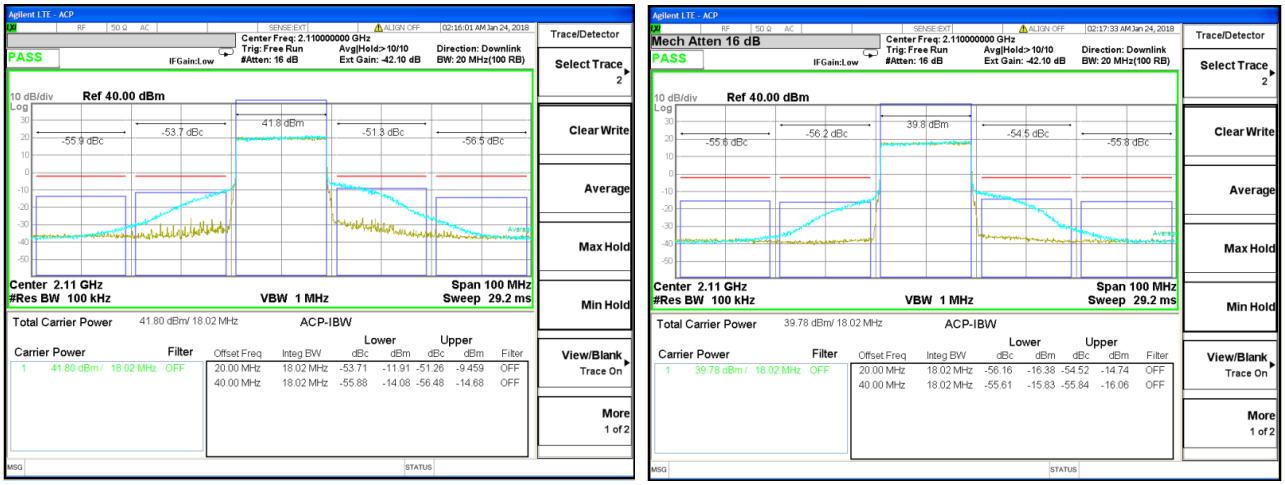


*Figure 9. 20MHz FDDTM1.1.WFM **PAR=10dB**@0.01% probability on the CCDF Signal, Pout 42&40dBm,showing spectrum analyzer plots before&after DPD*

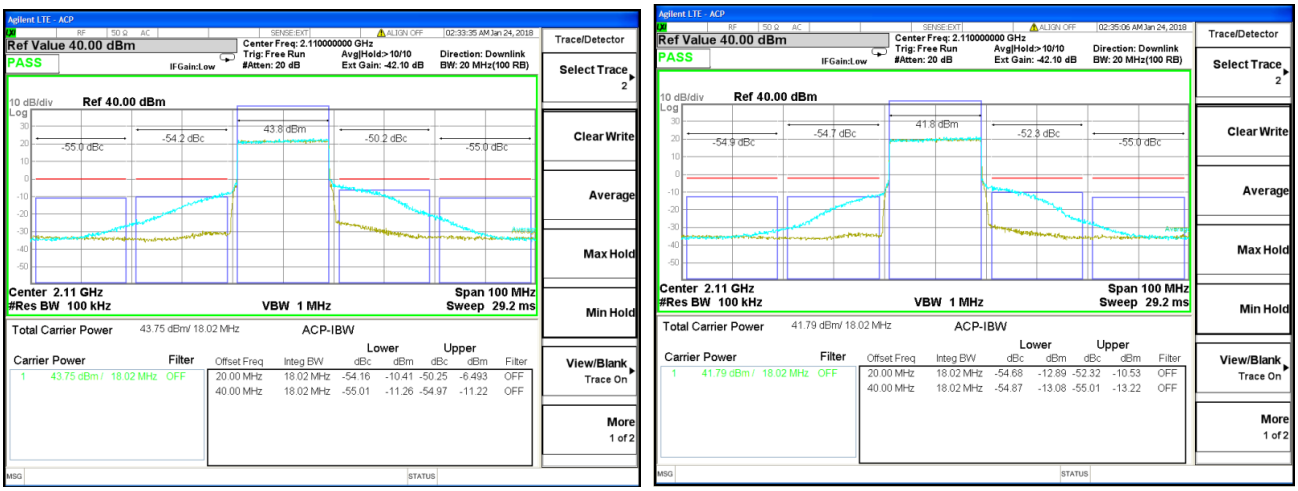


*Figure 10. 20MHz FDDTM1.1.WFM **PAR=8dB**@0.01% probability on the CCDF Signal, Pout 44&42dBm,showing spectrum analyzer plots before&after DPD*

Signal		Pout/dBm	ACPR-1/dBc	ACPR+1/dBc	ACPR-2/dBc	ACPR+2/dBc	Id/A	PAE (%)
PAR=10dB@0.01% probability on the CCDF	**Before DPD**	42.0	-35.2	-32.3	-54.9	-52.3	1.95	29.0%
	After DPD	41.8	-53.7	-51.3	-55.9	-56.5	1.90	28.4%
	Before DPD	40.0	-36.6	-33.8	-57.2	-54.2	1.58	22.6%
	After DPD	39.8	-56.2	-54.5	-55.6	-55.8	1.54	22.2%
PAR=8dB @0.01% probability on the CCDF	**Before DPD**	44.0	-34.4	-31.0	-53.1	-50.7	2.68	33.5%
	After DPD	43.8	-54.2	-50.2	-55.0	-55.0	2.66	32.2%
	Before DPD	41.9	-34.6	-33.8	-55.2	-55.9	1.94	28.5%
	After DPD	41.8	-54.7	-52.3	-54.9	-55.0	1.92	28.2%

Table 5. Summary of Results: Frequency: 2110MHz, 20MHZ FDDTM1.1.WFM Signal

PA settings: Drain Voltage 28V , Auxiliary Amplifier Bias Voltages 0.3V, Total Bias currents 500mA

2140MHZ, 20MHZ BANDWIDTH ACPR RESULTS

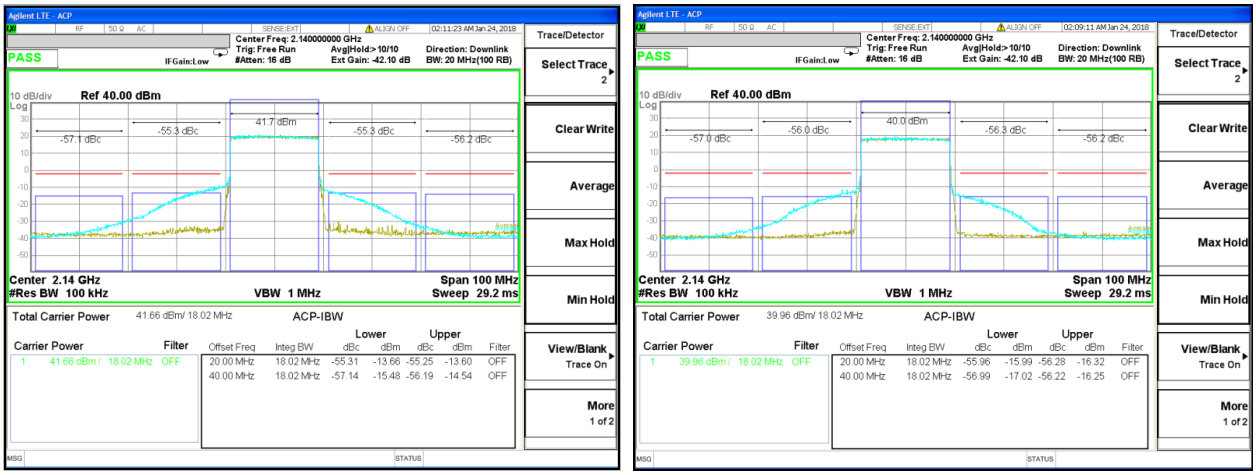


*Figure 11. 20MHz FDDTM1.1.WFM **PAR=10dB**@0.01% probability on the CCDF Signal, Pout 42&40dBm,showing spectrum analyzer plots before&after DPD*

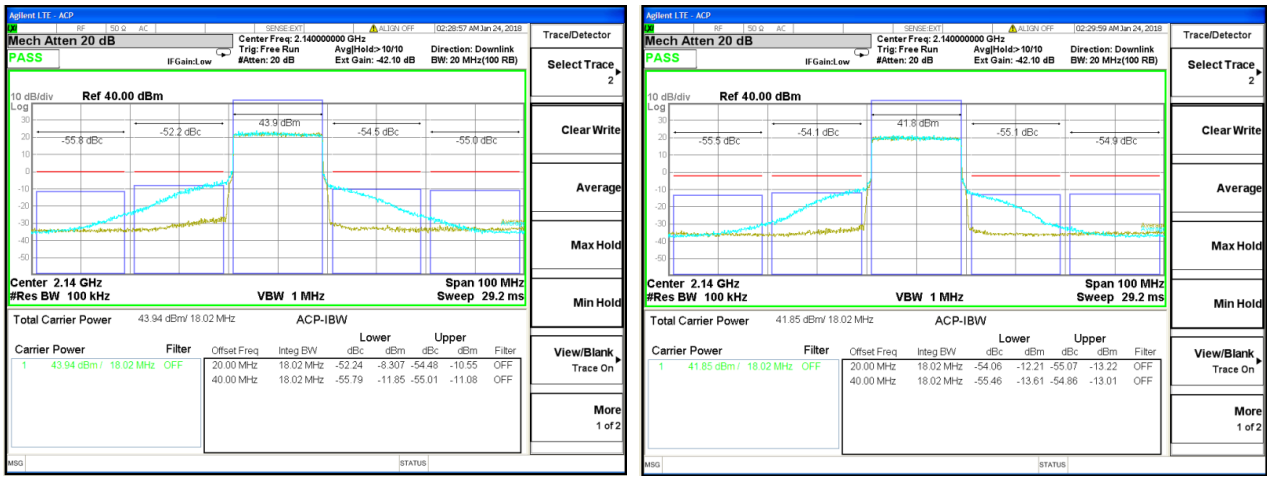


*Figure 12. 20MHz FDDTM1.1.WFM **PAR=8dB**@0.01% probability on the CCDF Signal, Pout 44&42dBm,showing spectrum analyzer plots before&after DPD*

Signal		Pout/dBm	ACPR-1/dBc	ACPR+1/dBc	ACPR-2/dBc	ACPR+2/dBc	Id/A	PAE (%)
PAR=10dB@0.01% probability on the CCDF	**Before DPD**	42.0	-34.7	-32.7	-56.1	-54.4	1.97	28.7%
	After DPD	41.7	-55.3	-55.3	-57.1	-56.2	1.91	27.6%
	Before DPD	40.1	-36.1	-34	-56.5	-55.8	1.64	22.3%
	After DPD	40.0	-56.0	-56.3	-57.0	-56.2	1.62	22.0%
PAR=8dB @0.01% probability on the CCDF	**Before DPD**	44.0	-34.2	-31.8	-53.5	-52.2	2.63	34.1%
	After DPD	43.9	-52.2	-54.5	-55.8	-55.0	2.60	33.7%
	Before DPD	42.0	-35.0	-32.9	-55.6	-54.7	1.99	28.4%
	After DPD	41.8	-54.1	-55.1	-55.5	-54.9	1.95	27.7%

Table 6. Summary of Results: Frequency: 2140MHz, 20MHZ FDDTM1.1.WFM Signal

PA settings: Drain Voltage 28V , Auxiliary Amplifier Bias Voltages 0.3V, Total Bias currents 500mA

2170MHZ, 20MHZ BANDWIDTH ACPR RESULTS

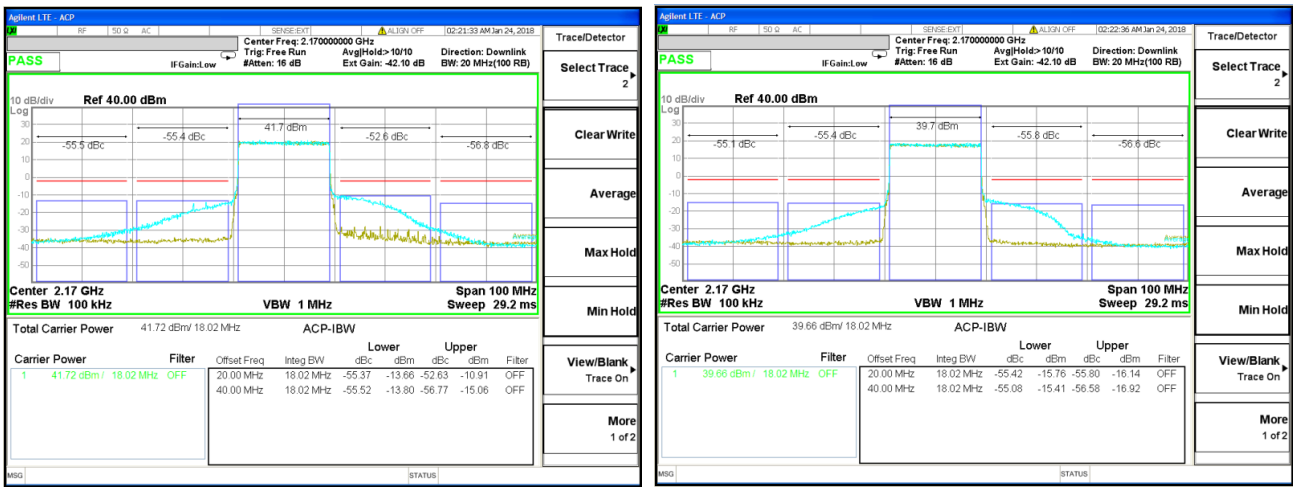


*Figure 13. 20MHz FDDTM1.1.WFM **PAR=10dB**@0.01% probability on the CCDF Signal, Pout 42&40dBm,showing spectrum analyzer plots before&after DPD*

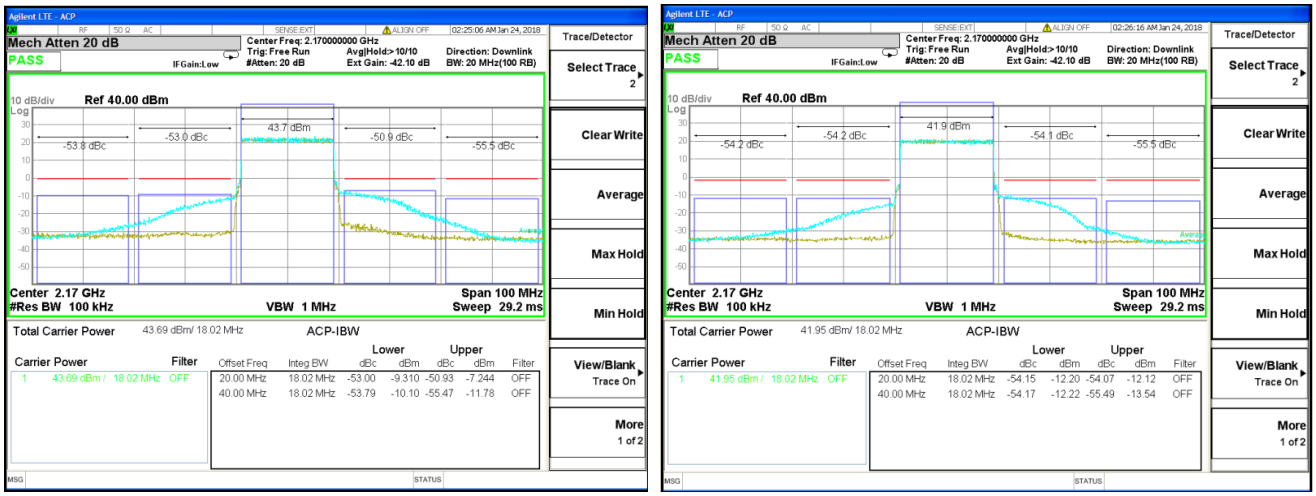


*Figure 14. 20MHz FDDTM1.1.WFM **PAR=8dB**@0.01% probability on the CCDF Signal, Pout 44&42dBm,showing spectrum analyzer plots before&after DPD*

Signal		Pout/dBm	ACPR-1/dBc	ACPR+1/dBc	ACPR-2/dBc	ACPR+2/dBc	Id/A	PAE (%)
PAR=10dB@0.01% probability on the CCDF	**Before DPD**	42.0	-35.5	-36.3	-52.4	-55.1	2.02	28.0%
	After DPD	41.7	-55.4	-52.6	-55.5	-56.8	1.92	27.5%
	Before DPD	40.0	-37.6	-37.8	-53.4	-55.9	1.61	22.2%
	After DPD	39.7	-55.4	-55.8	-55.1	-56.6	1.52	21.9%
PAR=8dB @0.01% probability on the CCDF	**Before DPD**	43.9	-35.8	-35.1	-51.6	-53.4	2.57	34.1%
	After DPD	43.7	-53.0	-50.9	-53.8	-55.5	2.50	33.5%
	Before DPD	42.0	-36.9	-36.6	-52.8	-55.6	2.0	28.3%
	After DPD	41.9	-54.2	-54.1	-54.2	-55.5	1.94	28.5%

Table 7. Summary of Results: Frequency: 2170MHz, 20MHZ FDDTM1.1.WFM Signal

PA settings: Drain Voltage 28V , Auxiliary Amplifier Bias Voltages 0.3V, Total Bias currents 500mA

ACPR VS POUT

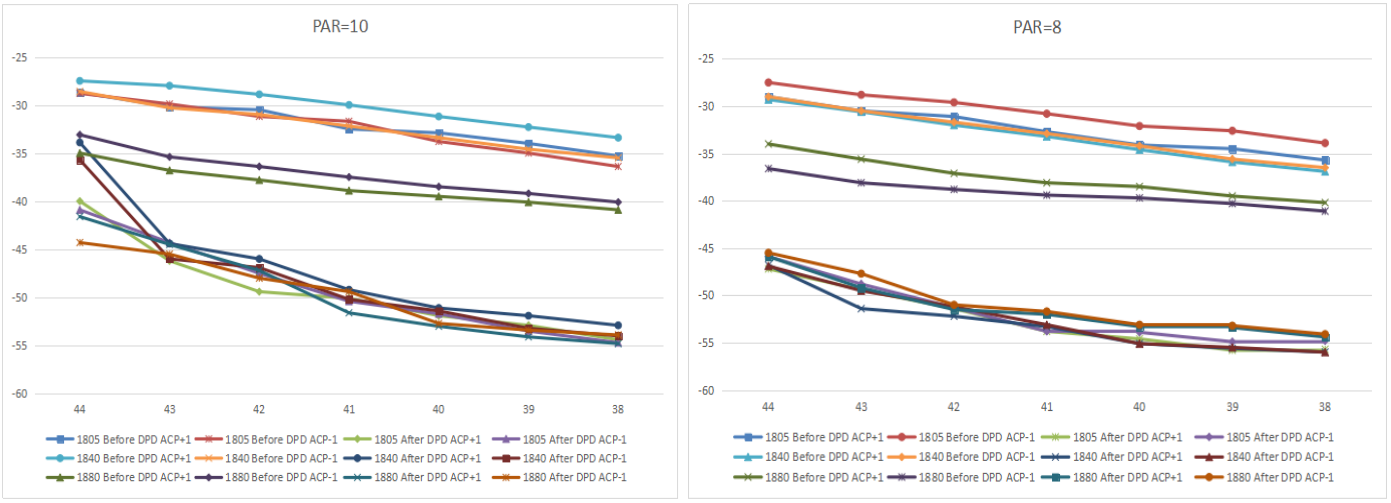


Figure 15. ACPR vs Output Power@PAR=10dB&PAR=8dB(1805、1840、1880MHz)

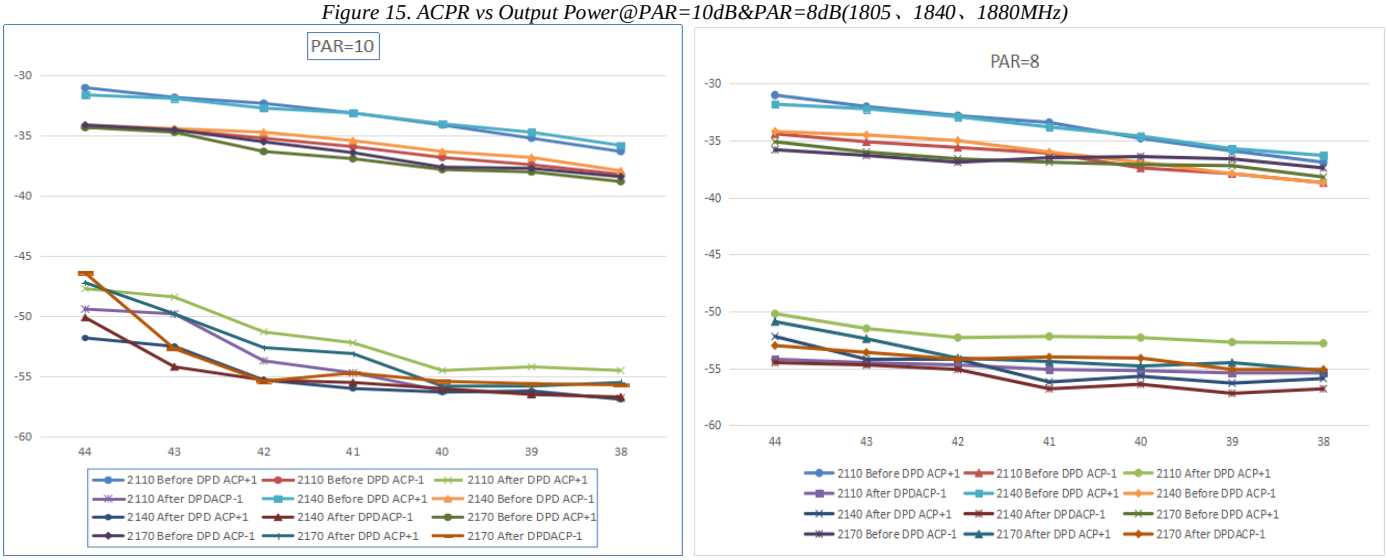


Figure 16. ACPR vs Output Power@PAR=10dB&PAR=8dB(2110、2140、2170MHz)

EFFICIENCY VS POUT

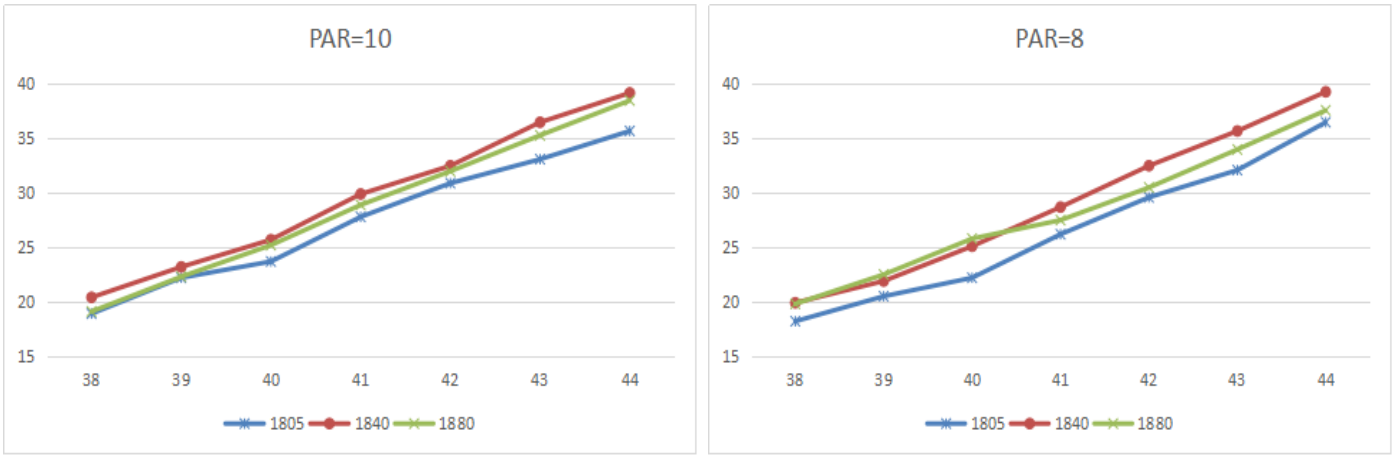


Figure 17. Efficiency vs Output Power@PAR=10dB&PAR=8dB(1805、1840、1880MHz)

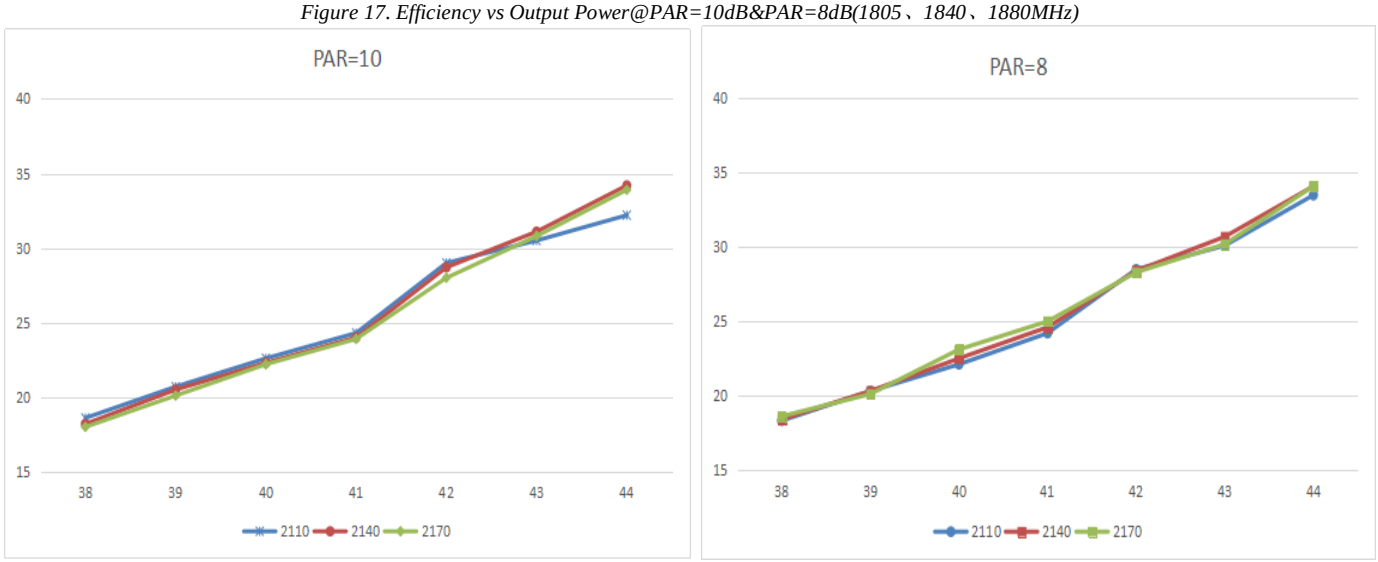


Figure 18. Efficiency vs Output Power@PAR=10dB&PAR=8dB(2110、2140、2170MHz)