Preliminary

Power Amplifier Pallet RTP21025-11

Product Features

- GaN on SiC + Doherty Technology
- High Efficiency
- Solid-state Linear Design
- Small and Light Weight
- Suitable for WCDMA/LTE
- 50 Ohm Input/Output Impedance
- High Reliability and Ruggedness
- Built in Output Isolator

Application

- WCDMA / LTE Repeater



Description

This HPA Module is a high gain and compact amplifier module for WCDMA and LTE Repeater use.

Electrical Specifications

PARAMETER	Symbol	Specification		
Frequency Range	BW	2110 ~ 2170MHz		
Operating Bandwidth within BW	OBW	5 ~ 20MHz		
Output Power	Pout	44dBm/ WCDMA 4FA, LTE		
SPECTRUM EMISSION MASK (with DPD)	SEM	PER 3GPP TS-25.141 & TS25.141		
ACLR (WCDMA 4FA) @ Po=+44dBm (typ.)	ACLR	Non-DPD	-25dBc@±5MHz -28dBc@±10MHz	@-30 ~ +60°C @ 48V @ PAR 7.5dB
		With-DPD	-45dBc@±5MHz -48dBc@±10MHz	
ACLR (LTE 10MHz 1FA) @ Po=+44dBm (typ.)		Non-DPD	-28dBc@±10MHz	
		With-DPD	-52dBc@±10MHz	
RF Gain	G	47dB ±3dB @frequency range, 25W Pavg, -30 ~ +60°C		
Input Return Loss	S11	-16dB (Max.)		
Output Return Loss	S22	-18dB (Max.)		
Normal Operating Voltage	VDC	+5.6V, +48V		
Current Consumption	IDD	0.13A / 5.6V, 1.3A / 48V (typ.)		
Efficiency	Eff	40%@48V(typ.)		
Gain Flatness	ΔG	Peak to peak 2dB Over operating frequency Peak to peak 0.5dB Over any 3.84MHz		
Harmonics (2nd, with DPD)	H	-45dBc (Max.)		
Feedback Output level @ 44dBm	FB	+6dBm ± 1dB		
Operating Temperature	To	-30℃ ~ + 60℃ (Ambient temp)		

Environmental Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	Ta	-30		+60	°C
Storage Temperature	Tstg	-40		+130	°C
Relative humidity w/o condensation	RH			95	%

Mechanical Specifications

Parameter	Value	Units	Limits
Dimensions	100.0 x 50.0 x 20.0	mm	
Weight	200(Max.)	g	
RF Input Connector	MCX(Female), customizable*		
RF Output Coupling Connector	MCX(Female), customizable*		
RF Output Connector	SMA(Female), customizable*		
DC Connector	Molex_4pin male (0022035045)		
Cooling	External Heat-sink		

Maximum Rating

Input Overdrive	P_{OD}	-2dBm	Max.
Load VSWR	Ψ	∞ : 1 (All Phase & Amplitude)	Nom.
Operating Case Temperature	Tc	+100	°C

Interface Connector

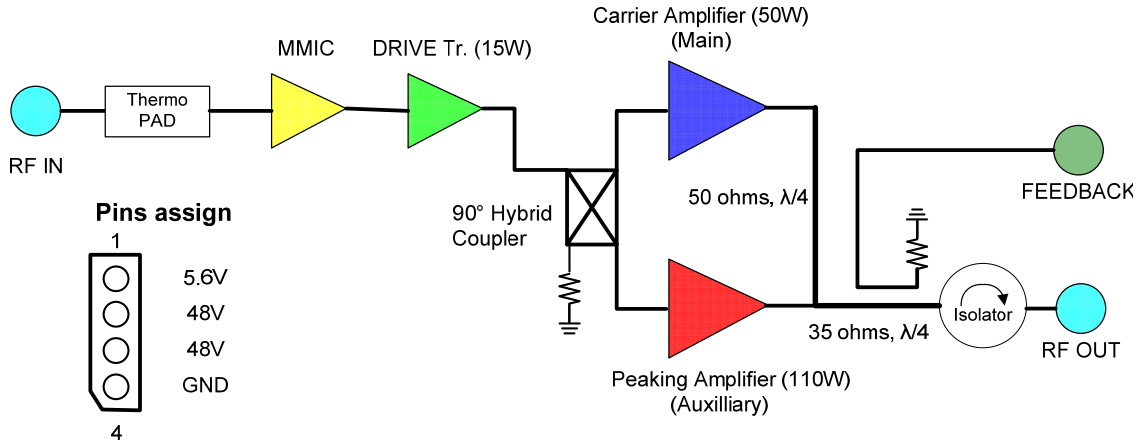
Connector type: MOLEX_4pin male (0022035045)

Pin #	Description	I/O	Specifications
1	VDC1	I	+5.6V
2, 3	VDC2	I	+48V
4	GND	-	Ground

*Note: Based on the customer's need, RFHIC can provide different types of connectors. Price may vary.

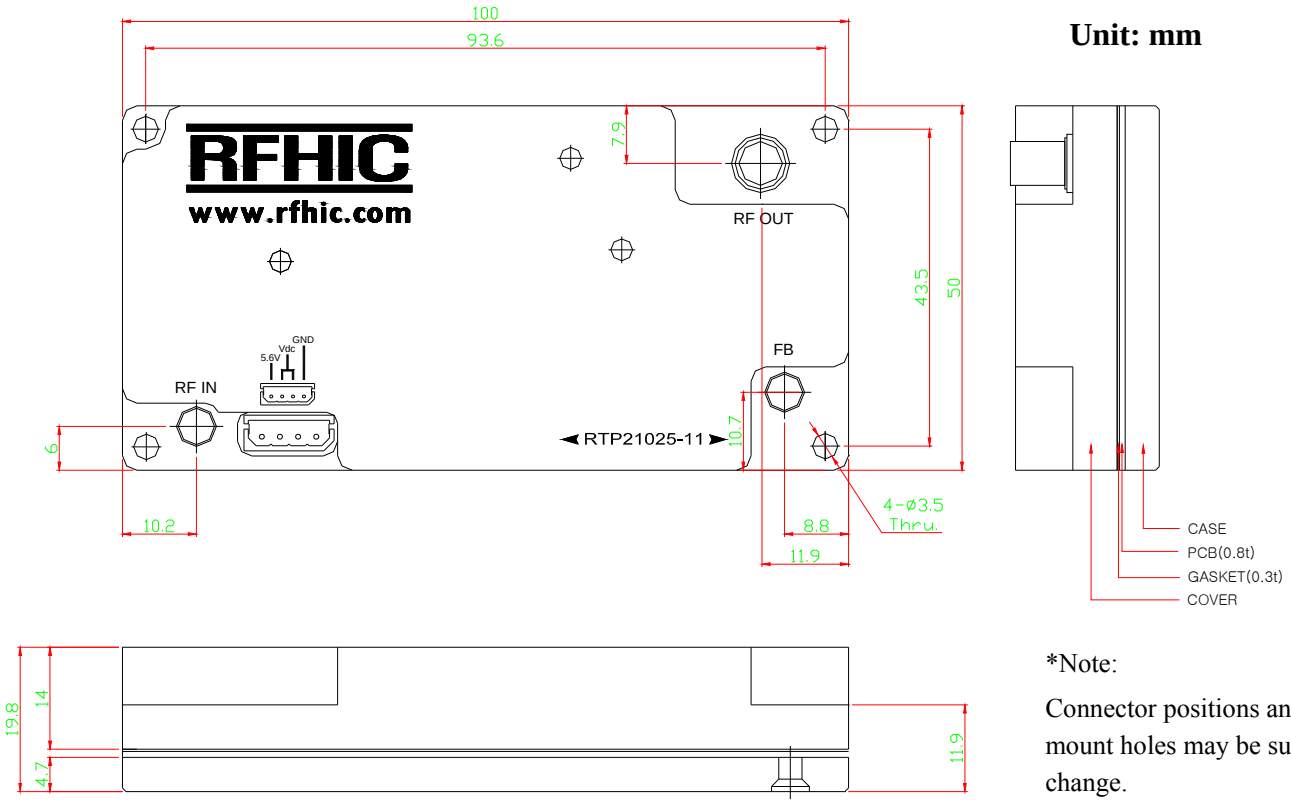
Gain Budget & Block Diagram

								TOTAL
GAIN(dB) :	-3dB	17dB	18dB	-3dB	17dB	1.3dB	-0.3dB	47dB
POWER :	-3dBm	-6dBm	11dBm	29dBm	26dBm	43dBm	44.3dBm	44dBm



Outline Drawing

Unit: mm



*Note:

Connector positions and module mount holes may be subjected to change.

Photo of Product



Test Equipments:

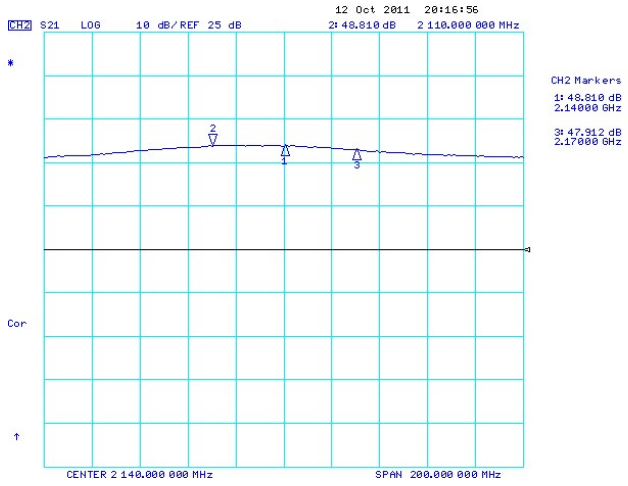
- DPD Engine : Optichron board (OP6180)
- Signal Generator: E4438C (Agilent)
- Spectrum Analyzer: E4440A (Agilent)
- Network Analyzer: 8753E (HEWLET PACKARD)
- Power Supply: 6674A (Agilent)

Test Condition:

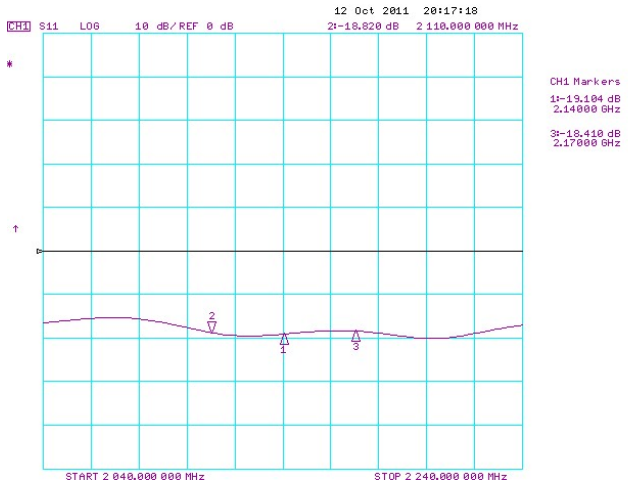
- Signal: WCDMA 4FA (Test Model 1 W/ 64DPCH) & LTE 10MHz 1FA
- PAR: 7.5dB
- CFR apply
- Temperature: 25°C
- AMP Temperature: 45°C

Test Data

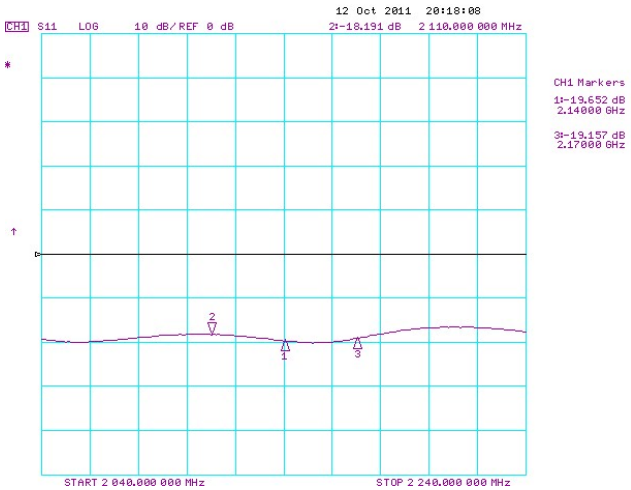
GAIN & GAIN FLATNESS



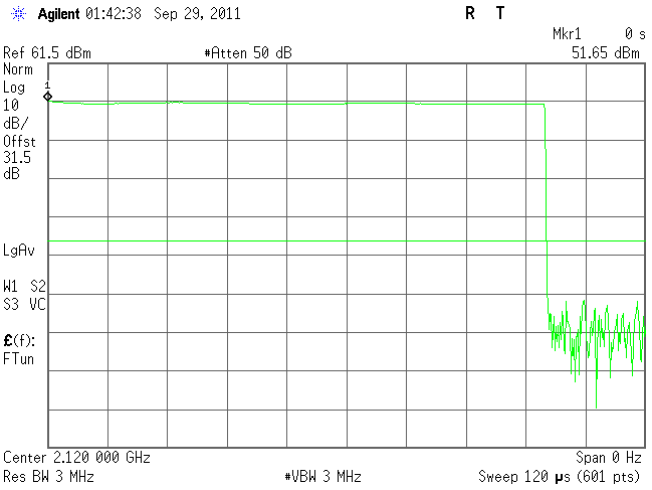
S11



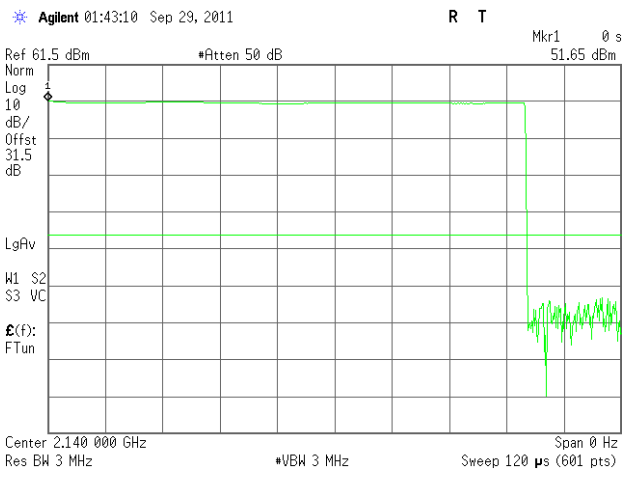
S22



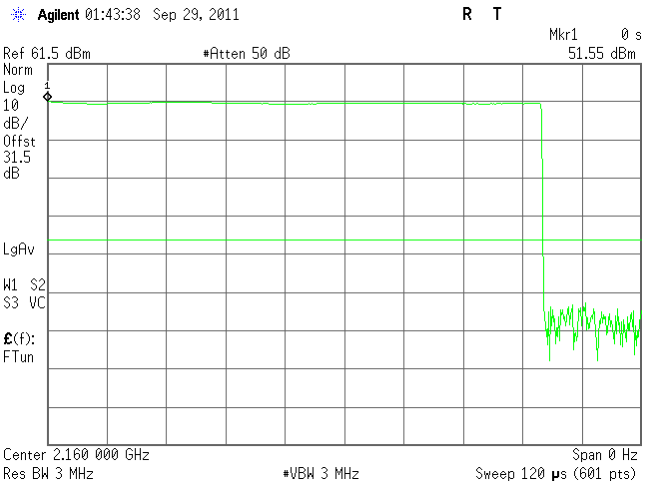
Psat = 51.65 dBm@2120MHz (Pulse duty cycle 10%)



Psat = 51.65 dBm@2140MHz (Pulse duty cycle 10%)

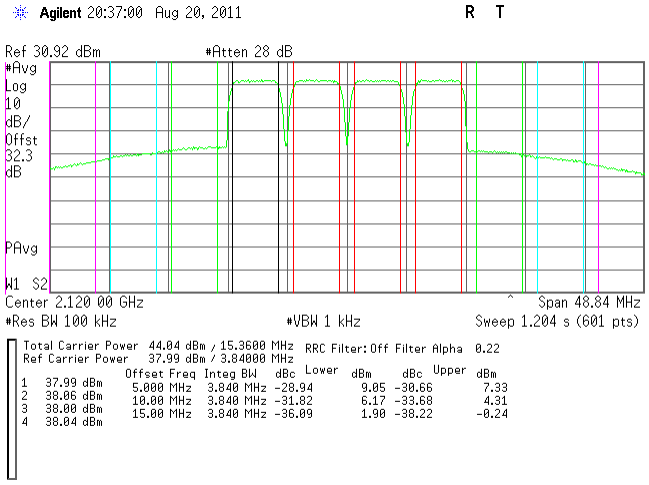


Psat = 51.55dBm@2160MHz (Pulse duty cycle 10%)



Test Results: DPD Operation (WCDMA 4FA)

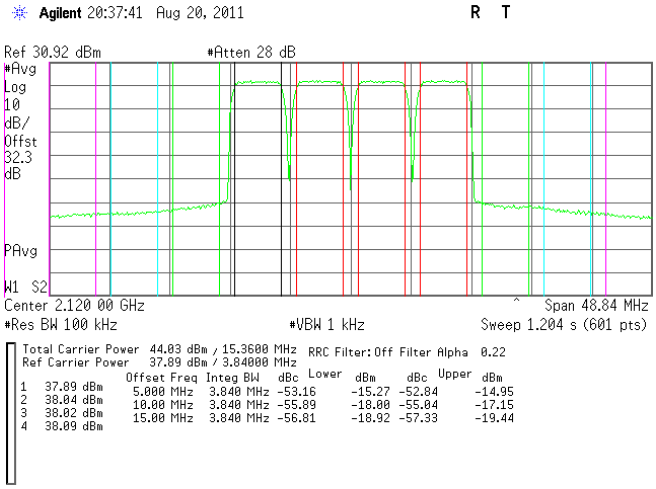
Pre - DPD@2120MHz



Total Carrier Power 44.04 dBm / 15.3600 MHz RRC Filter: Off Filter Alpha 0.22
Ref Carrier Power 37.99 dBm / 3.84000 MHz

		Offset Freq	Integ BW	dBc	Lower dBm	dBc	Upper dBm
1	37.99 dBm	5.000 MHz	3.840 MHz	-28.94	9.05	-30.66	7.33
2	38.06 dBm	10.00 MHz	3.840 MHz	-31.82	6.17	-33.68	4.31
3	38.00 dBm	15.00 MHz	3.840 MHz	-36.09	1.90	-38.22	-0.24
4	38.04 dBm						

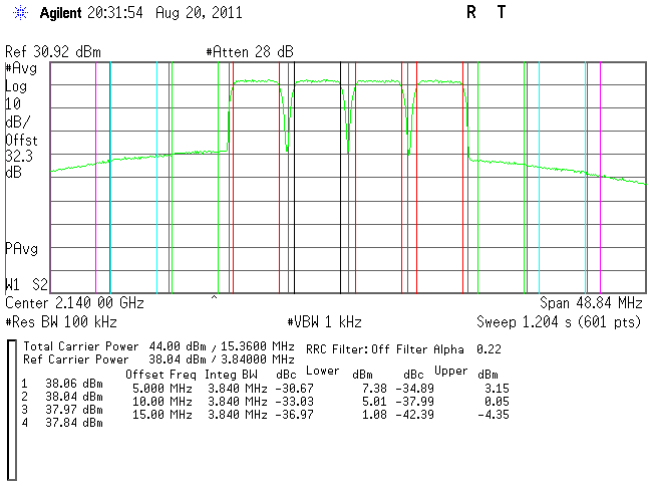
Post- DPD@2120MHz



Total Carrier Power 44.03 dBm / 15.3600 MHz RRC Filter: Off Filter Alpha 0.22
Ref Carrier Power 37.89 dBm / 3.84000 MHz

		Offset Freq	Integ BW	dBc	Lower dBm	dBc	Upper dBm
1	37.89 dBm	5.000 MHz	3.840 MHz	-53.16	-15.27	-52.84	-14.95
2	38.04 dBm	10.00 MHz	3.840 MHz	-55.89	-18.00	-55.04	-17.15
3	38.02 dBm	15.00 MHz	3.840 MHz	-56.81	-18.92	-57.33	-19.44
4	38.09 dBm						

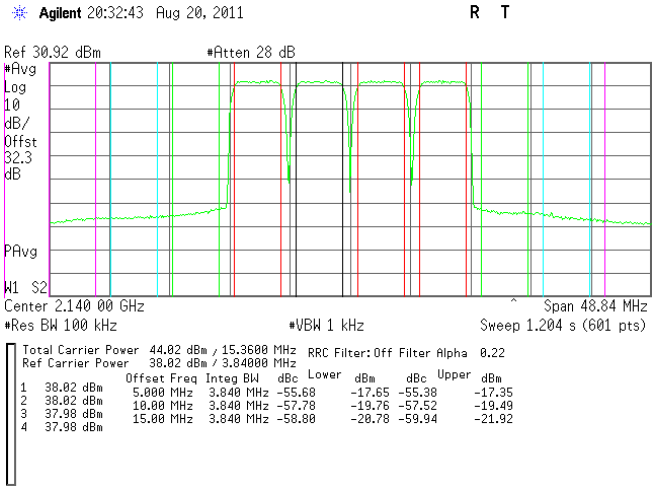
Pre - DPD@2140MHz



Total Carrier Power 44.00 dBm / 15.3600 MHz RRC Filter: Off Filter Alpha 0.22
Ref Carrier Power 38.04 dBm / 3.84000 MHz

		Offset Freq	Integ BW	dBc	Lower dBm	dBc	Upper dBm
1	38.06 dBm	5.000 MHz	3.840 MHz	-30.67	7.38	-34.89	3.15
2	38.04 dBm	10.00 MHz	3.840 MHz	-33.03	5.01	-37.99	0.05
3	37.97 dBm	15.00 MHz	3.840 MHz	-36.97	1.08	-42.39	-4.35
4	37.84 dBm						

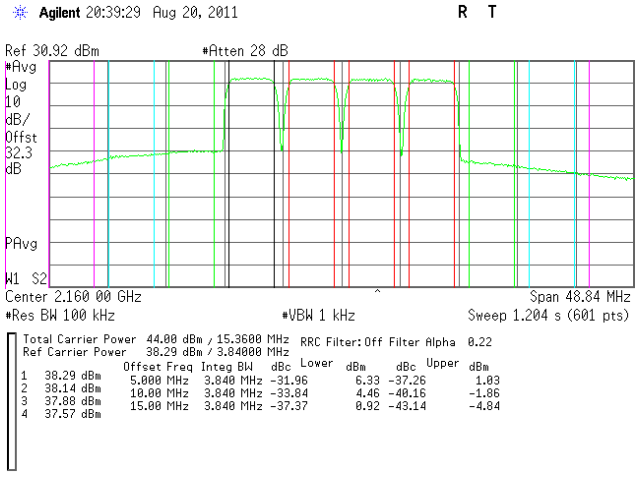
Post - DPD@2140MHz



Total Carrier Power 44.02 dBm / 15.3600 MHz RRC Filter: Off Filter Alpha 0.22
Ref Carrier Power 38.02 dBm / 3.84000 MHz

		Offset Freq	Integ BW	dBc	Lower dBm	dBc	Upper dBm
1	38.02 dBm	5.000 MHz	3.840 MHz	-55.68	-17.65	-55.38	-17.35
2	38.02 dBm	10.00 MHz	3.840 MHz	-57.78	-19.76	-57.52	-19.49
3	37.98 dBm	15.00 MHz	3.840 MHz	-58.80	-20.78	-59.94	-21.92
4	37.98 dBm						

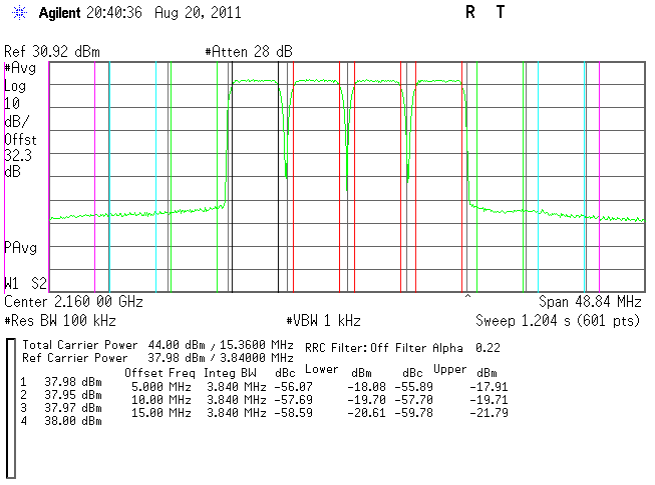
Pre - DPD@2160MHz



Total Carrier Power 44.00 dBm / 15.3600 MHz RRC Filter: Off Filter Alpha 0.22
Ref Carrier Power 38.29 dBm / 3.84000 MHz

		Offset Freq	Integ BW	dBc	Lower dBm	dBc	Upper dBm
1	38.29 dBm	5.000 MHz	3.840 MHz	-31.96	6.33	-37.26	1.03
2	38.14 dBm	10.00 MHz	3.840 MHz	-33.84	4.46	-40.16	-1.86
3	37.88 dBm	15.00 MHz	3.840 MHz	-37.37	0.92	-43.14	-4.84
4	37.57 dBm						

Post - DPD@2160MHz

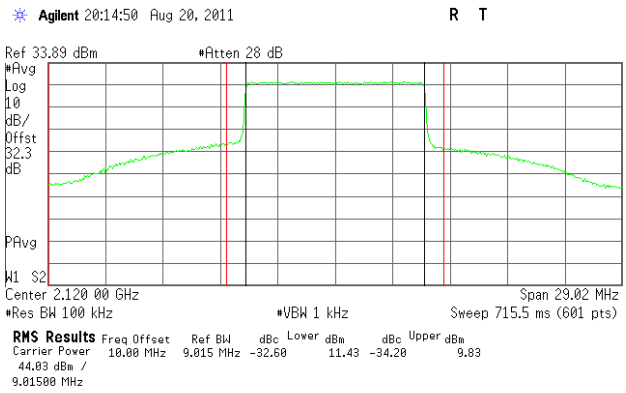


Total Carrier Power 44.00 dBm / 15.3600 MHz RRC Filter: Off Filter Alpha 0.22
Ref Carrier Power 37.98 dBm / 3.84000 MHz

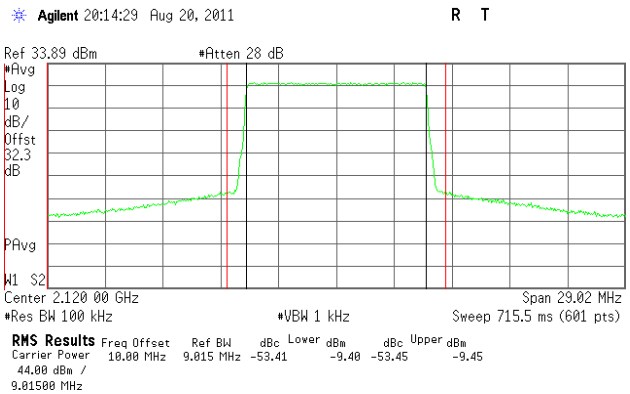
		Offset Freq	Integ BW	dBc	Lower dBm	dBc	Upper dBm
1	37.98 dBm	5.000 MHz	3.840 MHz	-56.07	-18.08	-55.89	-17.91
2	37.95 dBm	10.00 MHz	3.840 MHz	-57.69	-19.70	-57.70	-19.71
3	37.97 dBm	15.00 MHz	3.840 MHz	-58.59	-20.61	-59.78	-21.79
4	38.00 dBm						

LTE 10MHz 1FA

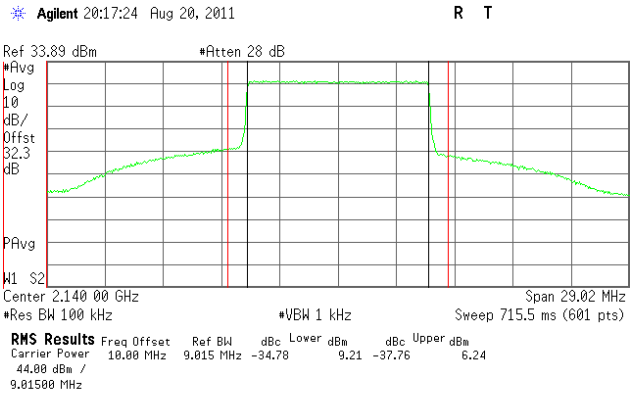
Pre - DPD@2120MHz



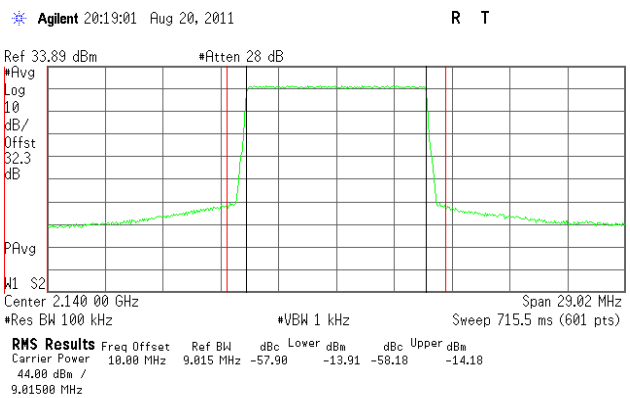
Post- DPD@2120MHz



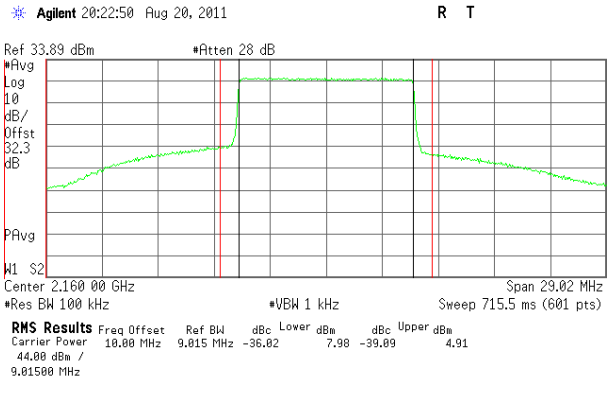
Pre - DPD@2140MHz



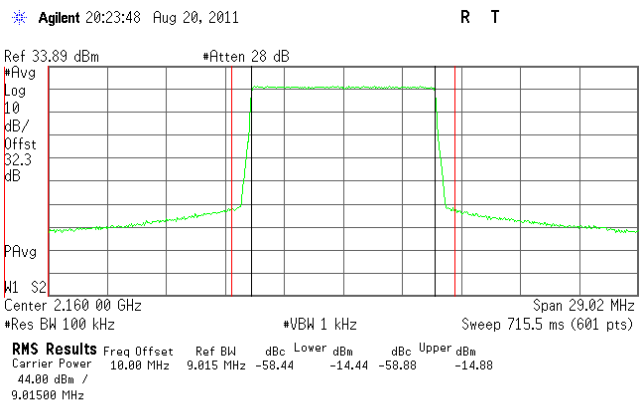
Post - DPD@2140MHz



Pre - DPD@2160MHz



Post - DPD@2160MHz



Test Sheet

S/N					
Gain			48.8dB		
Gain Flatness			0.9dB		
S11 (Max.)			-18.4dB		
S22 (Max.)			-18.2dB		
Feedback level@ 44dBm			6.5dBm		
Test Frequency (@Center)			2120MHz	2140 MHz	2160 MHz
Psat (dBm)			51.65	51.65	51.55
WCDMA 4FA @25W PAR:7.5dB	ACLR@±5MHz (dBc)	Pre-DPD	-28.9	-30.6	-31.9
		Post-DPD	-52.8	-55.3	-55.9
	ACLR@±10MHz (dBc)	Pre -DPD	-31.8	-33.0	-33.8
		Post-DPD	-55.0	-57.5	-57.7
	ACLR@±15MHz (dBc)	Pre -DPD	-36.1	-36.9	-37.3
		Post-DPD	-56.8	-58.8	-58.6
125mA/5.6V, Current/48V			1.30A	1.32A	1.35A
Efficiency		%	39.6	39.0	38.1

LTE 10MHz 1FA PAR:7.5dB	ACLR@±10MHz (dBc)	Pre -DPD	-32.6	-34.7	-36
		Post-DPD	-53.4	-57.9	-58.4
125mA/5.6V, Current/48V			1.25A	1.27A	1.31A
Efficiency		%	41.2	40.5	39.3

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