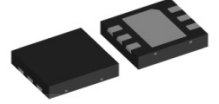


Product Features

- Up to 6GHz
- 14W Saturated Power @ 48V, 2.6GHz
- 60% Drain Efficiency @ Psat, 2.6GHz
- 35% Drain Efficiency @ 35dBm, 2.6GHz

Applications

- WiMAX, LTE, WCDMA, GSM
- Multi-Band, Multi-Mode
- Multi-Carrier
- High Efficiency, Doherty Amplifier



Package Type : DFN66726L-Q2

Typical Single-Carrier LTE Performance ($V_{DS} = +48V$, $T_C = 25^\circ C$, 50Ω)

Frequency[MHz]	Peak Power		Average Power ^{*1}			
	Power[W]	Drain Efficiency[%]	Power[W]	Gain[dB]	Drain Efficiency[%]	ACLR[dBc]
2505	18.5	66.6	3.2	18.4	35.1	-32.1
2595	17.0	63.3	3.2	18.5	35.2	-31.3
2685	15.8	63.6	3.2	18.3	37.3	-29.2

Note

*1 Measured in the ETQ2014P test board amplifier circuit, under LTE 10MHz, PAR 7.5dB @0.01% probability on CCDF

Absolute Maximum Ratings

Rating	Symbol	Value	Unit	Condition
Drain to Source Voltage	V_{DSS}	150	V	$T_C = 25^\circ C$
Gate to Source Voltage	V_{GS}	-10, +2	V	$T_C = 25^\circ C$
Operating Voltage	V_{DD}	52	V_{DC}	-
Maximum Forward Gate Current	I_{GMAX}	2.1	mA	$T_C = 25^\circ C$
Maximum Drain Current ^{*1}	I_{DMAX}	0.75	A	$T_C = 25^\circ C$
Power Dissipation	P_{DISS}	17.3	W	$T_C = 85^\circ C$
Storage Temperature	T_{STG}	-65, +150	$^\circ C$	-
Case Operating Temperature	T_C	-40, +150	$^\circ C$	30 seconds
Operating Junction Temperature ^{*2}	T_J	225	$^\circ C$	-
Soldering Temperature ^{*3}	T_S	245	$^\circ C$	-

Note

*1 Current Limit for long term, reliable operation.

*2 Continuous use at maximum temperature will affect MTTF.

*3 Refer to the Application Note(AN-002) on soldering - "Solder Condition for RFHIC's GaN Device"

Thermal Characteristics

Rating	Symbol	Value	Unit	Condition
Thermal Resistance, Junction to Case	$R_{\theta JC}$	8.10 ^{*1}	$^\circ C/W$	$T_C = 85^\circ C$
		8.91 ^{*2}		

Note

*1 Measured for the ETQ2014P at dissipation power of 17.3W.

*2 Measured for the ETQ2014P at dissipation power of 1.57W.

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Characteristics	Conditions	Symbol	Min	Typ	Max	Unit
DC Characteristics ^{*1}						
Gate Threshold Voltage	V _{DS} = 10V	V _{GS(TH)}	-3.8	-3.0	-2.3	V _{DC}
	I _D = 2.1mA					
Gate Quiescent Voltage	V _{DS} = 48V	V _{GS(Q)}	-	-2.6	-	V _{DC}
	I _D = 50mA					
Saturated Drain Current ^{*2}	V _{DS} = 6V	I _{DS}	1.7	2.1	-	A
	V _{GS} = 2V					
Drain-Source Breakdown Voltage	V _{GS} = -8V	V _{BR}	150	-	-	V
	I _D = 2.1mA					
Gate Leakage Current	V _{GS} = -8V	I _{GLKG}	-0.46	-	-	mA
	V _{DS} = 120V					
Drain Leakage Current	V _{GS} = -8V	I _{DLKG}	-	-	0.84	mA
	V _{DS} = 120V					
RF Characteristics (Fc=2595MHz unless otherwise noted)						
Saturated Output Power ^{*3,6}	V _{DS} = 48V	P _{SAT}	-	14	-	W
	I _{DQ} = 50mA					
Pulsed Drain Efficiency ^{*3}	V _{DS} = 48V	η	55	60	-	%
	I _{DQ} = 50mA					
	P _{OUT} = P _{SAT} Pulsed					
Modulated Gain ^{*4}	V _{DS} = 48V	G _{BR}	17.0	18.5	-	dB
	I _{DQ} = 50mA					
	P _{OUT} = 35dBm					
LTE Linearity ^{*4}	V _{DS} = 48V	ACLR	-	-30.0	-28.0	dBc
	I _{DQ} = 50mA					
	P _{OUT} = 35dBm					
Modulated Drain Efficiency ^{*4}	V _{DS} = 48V	η	32.0	35.0	-	%
	I _{DQ} = 50mA					
	P _{OUT} = 35dBm					
Output Mismatch Stress ^{*3, 5}	V _{DS} = 48V	VSWR	-	-	10:1	ψ
	I _{DQ} = 50mA					
	P _{OUT} = P _{SAT} Pulsed					

Note

*1 Measured on wafer prior to packaging.

*2 Scaled from PCM data.

*3 Pulse width 100 μsec , Duty Cycle 10%.

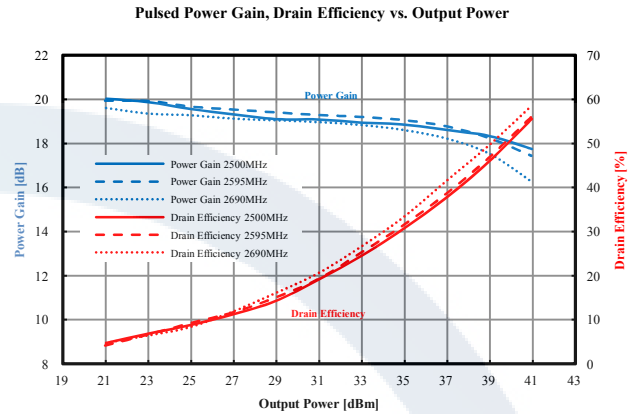
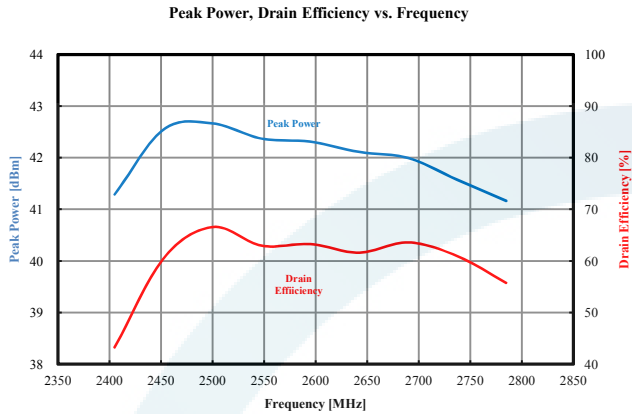
*4 Measured in the ETQ2014P-2600MHz test board amplifier circuit, under LTE 10MHz, PAR7.5dB @0.01% probability on CCDF.

*5 Measured in the ETQ2014P-2600MHz test board amplifier circuit. No damage at all phase angles.

*6 Psat is defined as $\Delta P_{out}/\Delta P_{in} < 0.1$, where ΔP_{in} is increased input power, ΔP_{out} is increased output power.

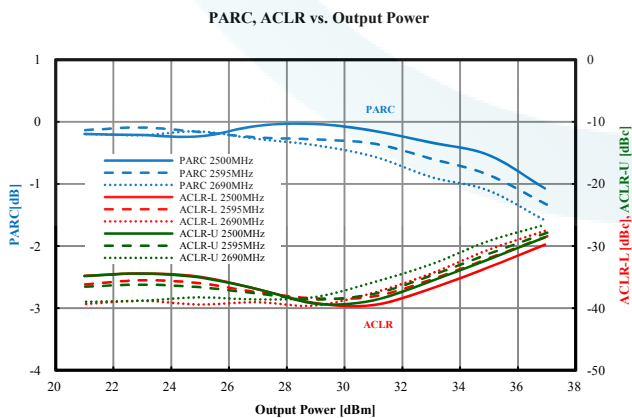
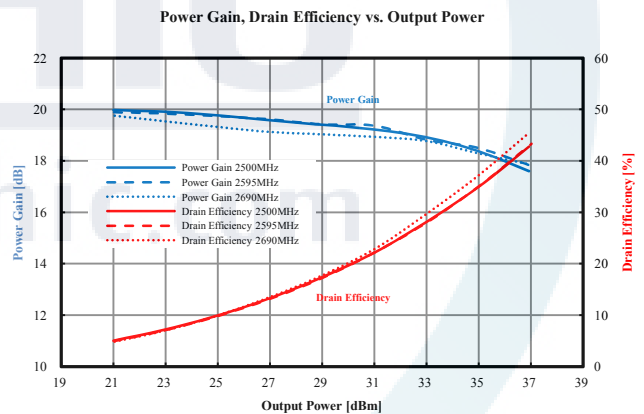
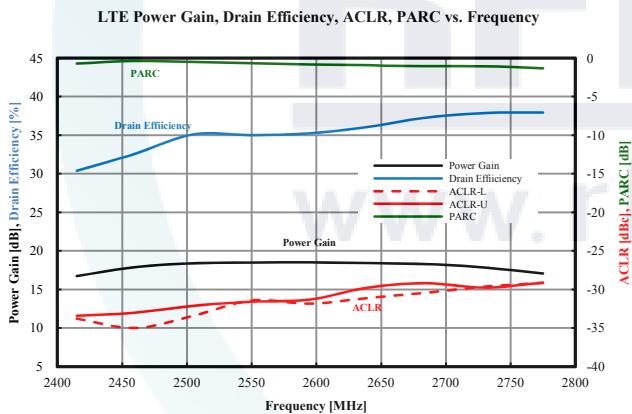
Typical Pulsed Signal Performance

(Tc=25°C, Measured in the ETQ2014P-2600MHz test board amplifier circuit)


 $V_{DS} = 48V, \quad I_{DQ} = 50mA, \text{ Pulse Width} = 100\mu\text{sec}, \text{ Duty Cycle} = 10\%$

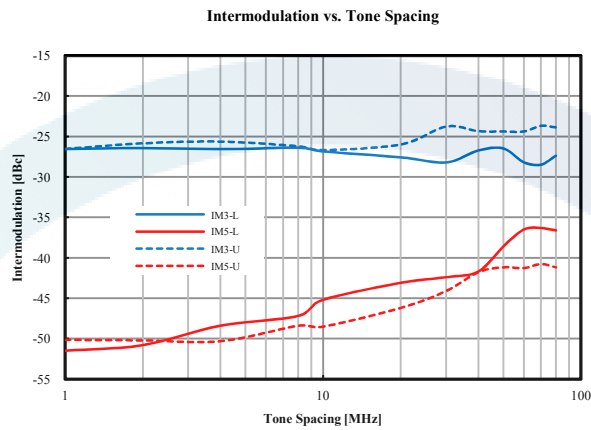
Typical LTE Signal Performance

(Tc=25°C, Measured in the ETQ2014P-2600MHz test board amplifier circuit)


 $P_{AVG} = 35dBm, \quad V_{DS} = 48V, \quad I_{DQ} = 50mA$
 LTE 10MHz BW, PAPR=7.5dB @ 0.01% Probability on CCDF

Typical 2-tone Intermodulation Imbalance Performance

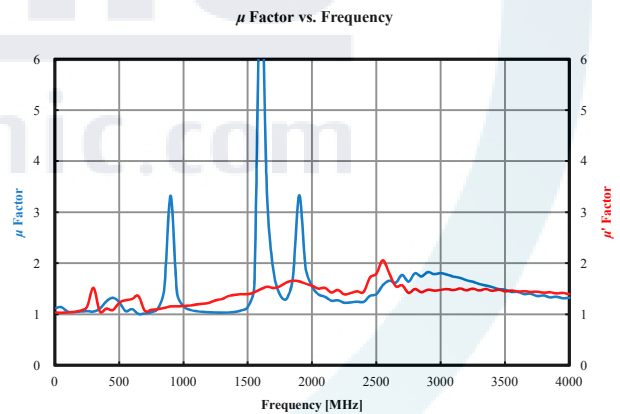
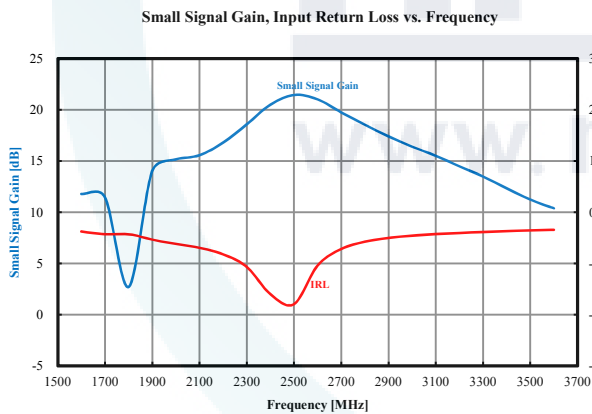
($T_c=25^\circ\text{C}$, Measured in the ETQ2014P-2600MHz test board amplifier circuit)



2-tone Power = 39.5dBm, $V_{DS} = 48\text{V}$, $I_{DQ} = 50\text{mA}$

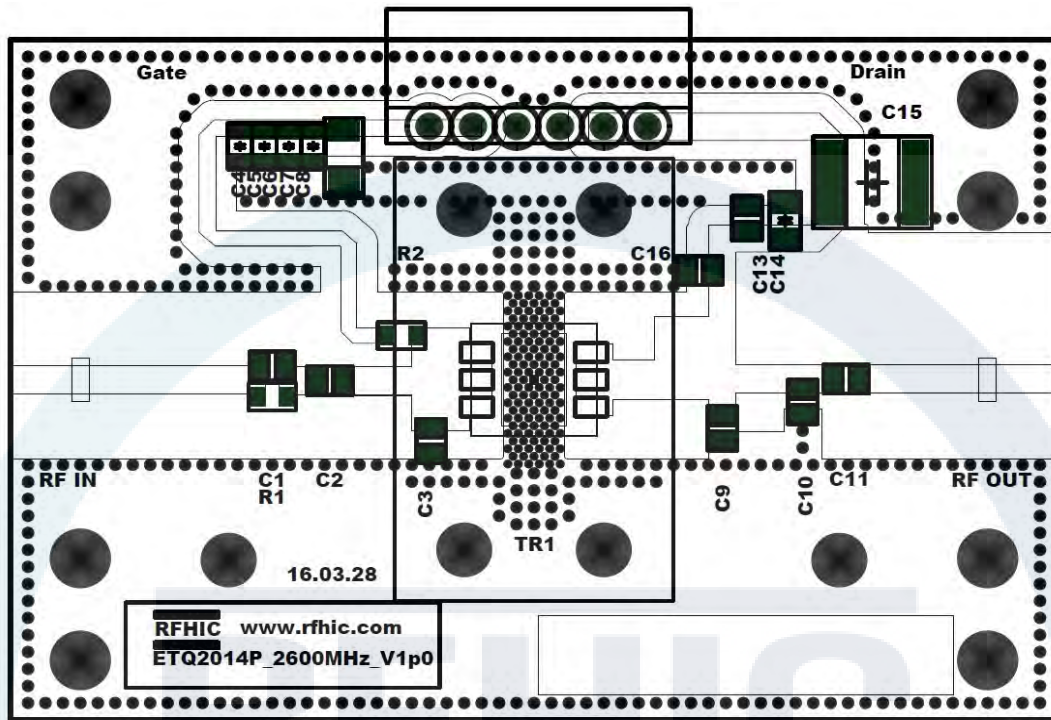
Typical Small Signal Performance

($T_c=25^\circ\text{C}$, Measured in the ETQ2014P-2600MHz test board amplifier circuit)



$P_{IN} = 0\text{dBm}$, $V_{DS} = 48\text{V}$, $I_{DQ} = 50\text{mA}$

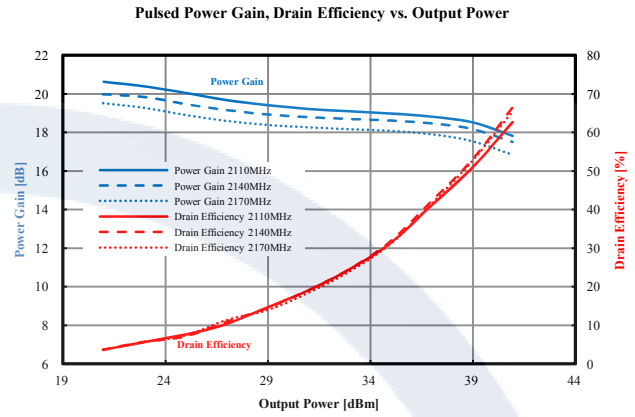
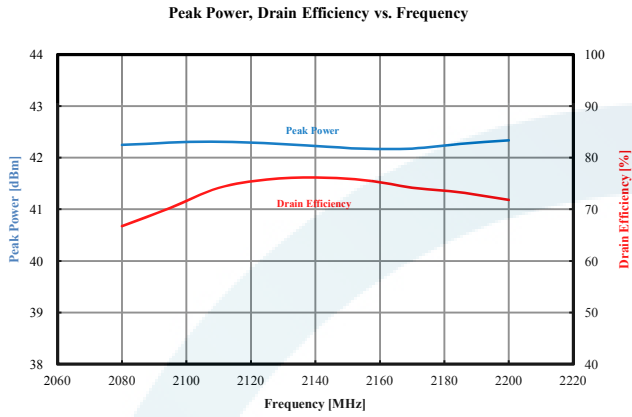
Test Board Component Layout(2600MHz)



Part	Description	Part Number	Manufacturer
R1	20 ohm Chip Resistor	MCR10EZPJ200	ROHM
R2	200 ohm Chip Resistor	MCR10EZPJ201	ROHM
C1	2.2pF High Q Capacitor	201CHA2R2CSLE	TEMEX
C2	1.2pF High Q Capacitor	201CHA1R2BSLE	TEMEX
C3	-	-	-
C4	10pF Chip Capacitor	GRM1885C1H100JA01D	MURATA
C5	100pF Chip Capacitor	GRM1885C1H101JA01D	MURATA
C6	1nF Chip Capacitor	GRM188R71H102KA01D	MURATA
C7	1uF Chip Capacitor	GRM188R71H105KA01D	MURATA
C8	Polymer Capacitor	TCJA106M016R0200	AVX
C9	0.5pF High Q Capacitor	201CHA0R5BSLE	TEMEX
C10	0.8pF High Q Capacitor	201CHA0R8BSLE	TEMEX
C11	1.8pF High Q Capacitor	201CHA1R8CSLE	TEMEX
C12	-	-	-
C13	10pF High Q Capacitor	201CHA100JSLE	TEMEX
C14	100pF High Q Capacitor	201CHA101JSLE	TEMEX
C15	10uF MLCC	RS80R2A106M	MARUWA
C16	6.8pF High Q Capacitor	201CHA6R8CSLE	TEMEX
CON1	DC Connector	5268-06A	MOLEX
PCB	$\epsilon_r=3.66 \pm 0.05$, 0.030" (0.762mm)	RO4350B	ROGERS Corp.
TR1	14W GaN Transistor	ETQ2014P	RFHIC

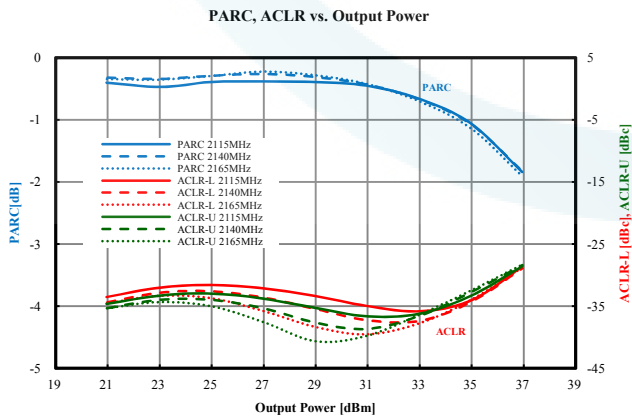
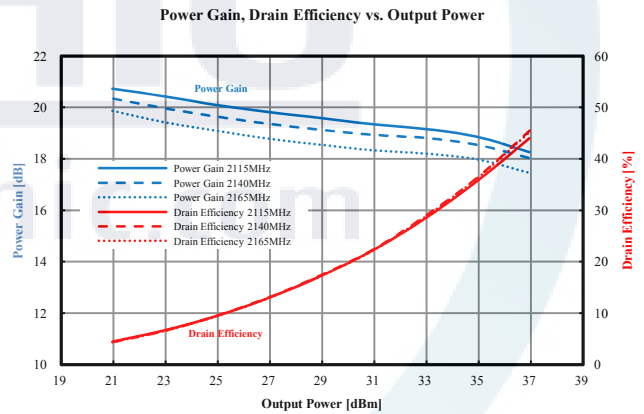
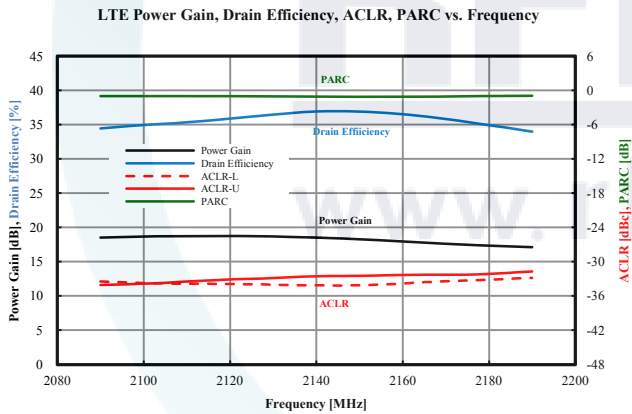
Typical Pulsed Signal Performance

(Tc=25°C, Measured in the ETQ2014P-2100MHz test board amplifier circuit)


 $V_{DS} = 48V$, $I_{DQ} = 50mA$, Pulse Width = 100μsec, Duty Cycle = 10%

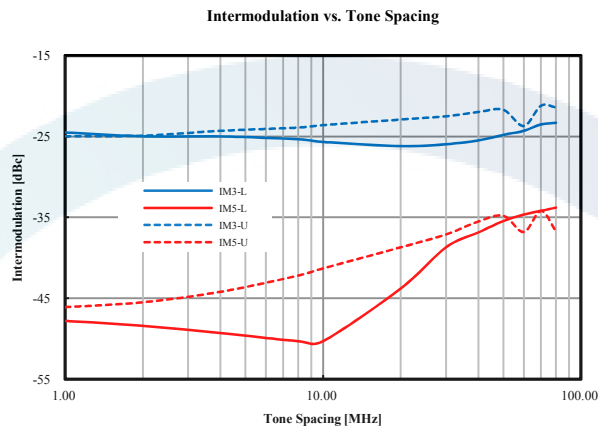
Typical LTE Signal Performance

(Tc=25°C, Measured in the ETQ2014P-2100MHz test board amplifier circuit)


 $P_{AVG} = 35dBm$, $V_{DS} = 48V$, $I_{DQ} = 50mA$
 LTE 10MHz BW, PAPR=7.5dB @ 0.01% Probability on CCDF

Typical 2-tone Intermodulation Imbalance Performance

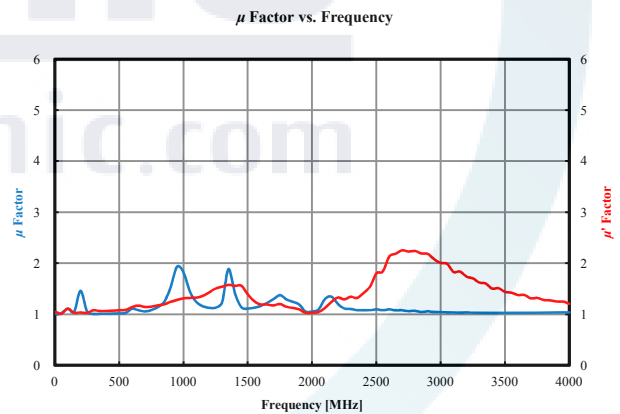
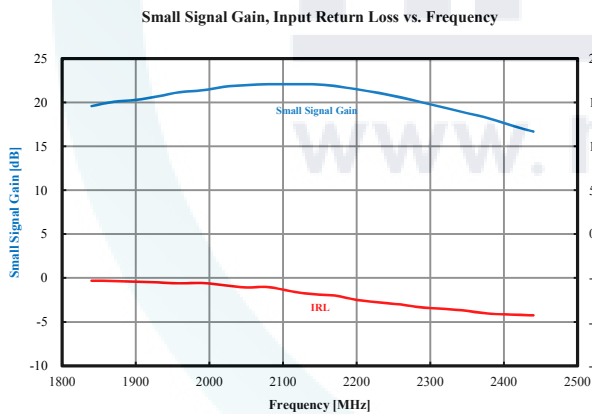
($T_c=25^\circ\text{C}$, Measured in the ETQ2014P-2100MHz test board amplifier circuit)



2-tone Power = 39.5dBm, $V_{DS} = 48\text{V}$, $I_{DQ} = 50\text{mA}$

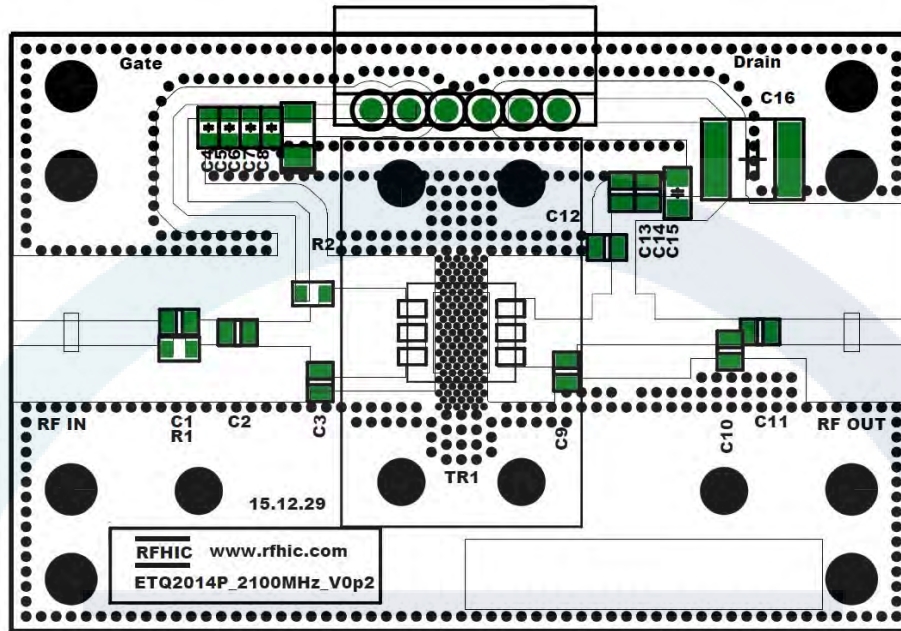
Typical Small Signal Performance

($T_c=25^\circ\text{C}$, Measured in the ETQ2014P-2100MHz test board amplifier circuit)



$P_{IN} = 0\text{dBm}$, $V_{DS} = 48\text{V}$, $I_{DQ} = 50\text{mA}$

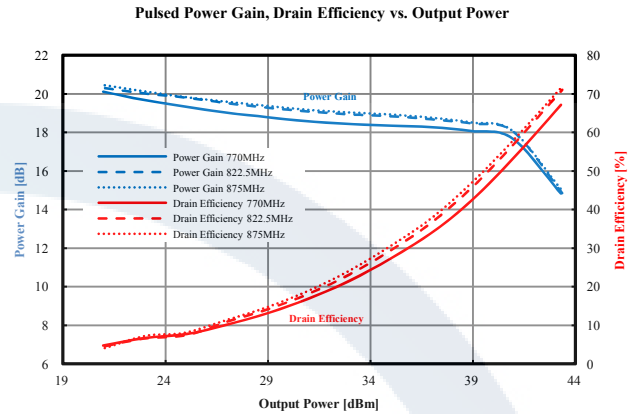
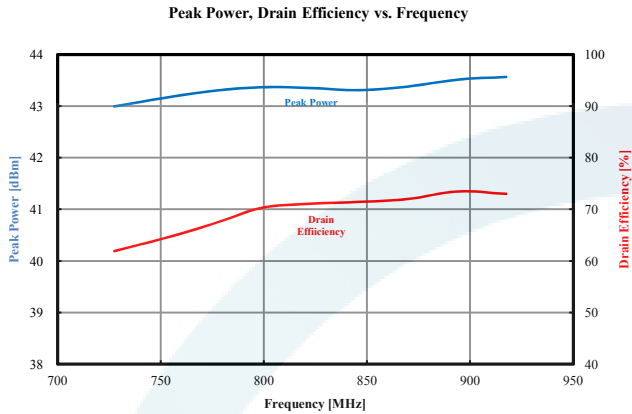
Test Board Component Layout(2100MHz)



Part	Description	Part Number	Manufacturer
R1	30 ohm Chip Resistor	MCR10EZPJ300	ROHM
R2	200 ohm Chip Resistor	MCR10EZPJ201	ROHM
C1	1.5pF High Q Capacitor	201CHA1R5BSLE	TEMEX
C2	5.1pF High Q Capacitor	201CHA5R1CSLE	TEMEX
C3, C9	0.7pF High Q Capacitor	201CHA0R7BSLE	TEMEX
C4	10F Chip Capacitor	GRM1885C1H100JA01D	MURATA
C5	100F Chip Capacitor	GRM1885C1H101JA01D	MURATA
C6	1nF Chip Capacitor	GRM188R71H102KA01D	MURATA
C7	1uF Chip Capacitor	GRM188R71H105KA01D	MURATA
C8	Polymer Capacitor	TCJA106M016R0200	AVX
C10	1.8pF High Q Capacitor	201CHA1R8CSLE	TEMEX
C11, C12	10pF High Q Capacitor	201CHA100JSLE	TEMEX
C13	100pF High Q Capacitor	201CHA101JSLE	TEMEX
C14, C15	-	-	-
C16	10uF MLCC	RS80R2A106M	MARUWA
CON1	DC Connector	5268-06A	MOLEX
PCB	$\epsilon_r=3.66 \pm 0.05$, 0.030" (0.762mm)	RO4350B	ROGERS Corp.
TR1	14W GaN Transistor	ETQ2014P	RFHIC

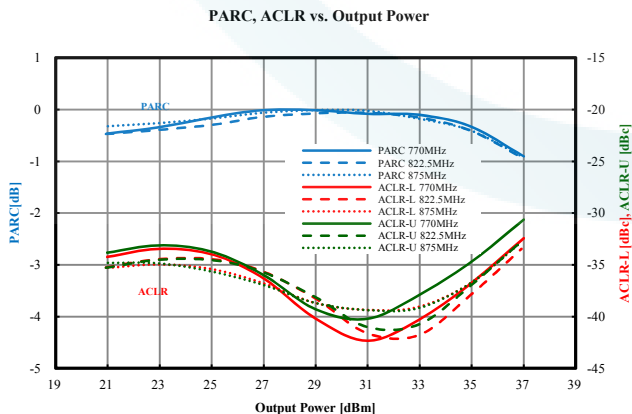
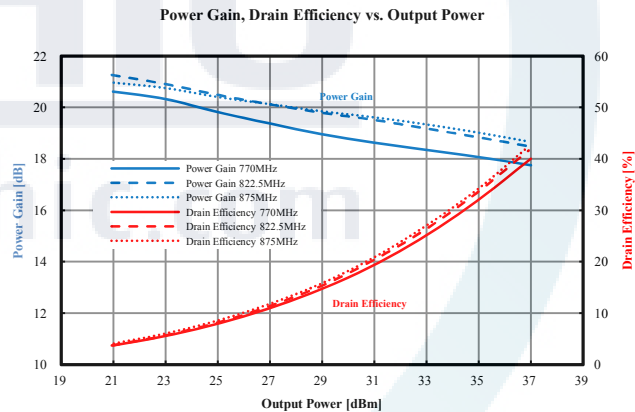
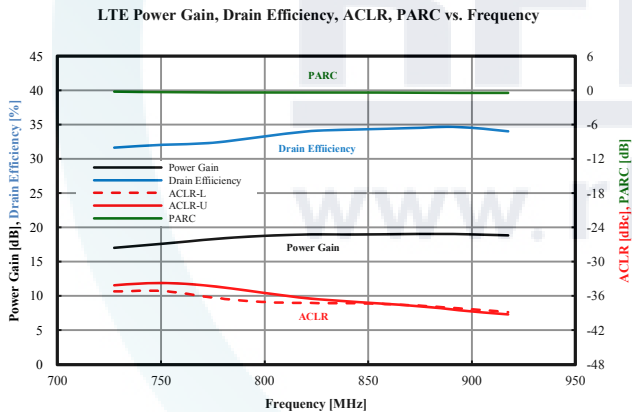
Typical Pulsed Signal Performance

(Tc=25°C, Measured in the ETQ2014P-800MHz test board amplifier circuit)


 $V_{DS} = 48V$, $I_{DQ} = 50mA$, Pulse Width = 100μsec, Duty Cycle = 10%

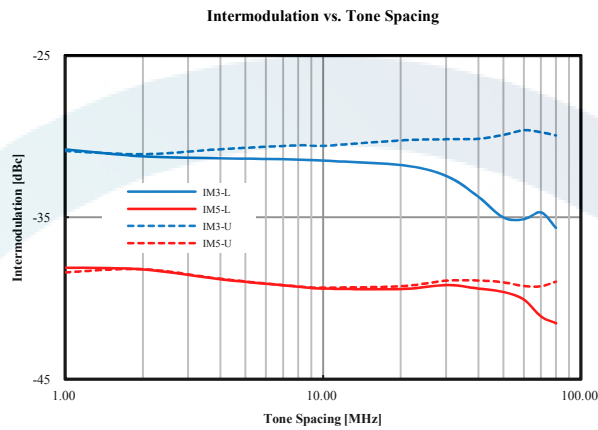
Typical LTE Signal Performance

(Tc=25°C, Measured in the ETQ2014P-800MHz test board amplifier circuit)


 $P_{AVG} = 35dBm$, $V_{DS} = 48V$, $I_{DQ} = 50mA$
 LTE 10MHz BW, PAPR=7.5dB @ 0.01% Probability on CCDF

Typical 2-tone Intermodulation Imbalance Performance

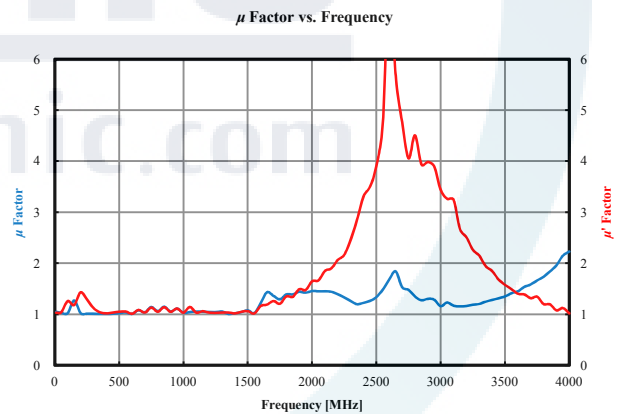
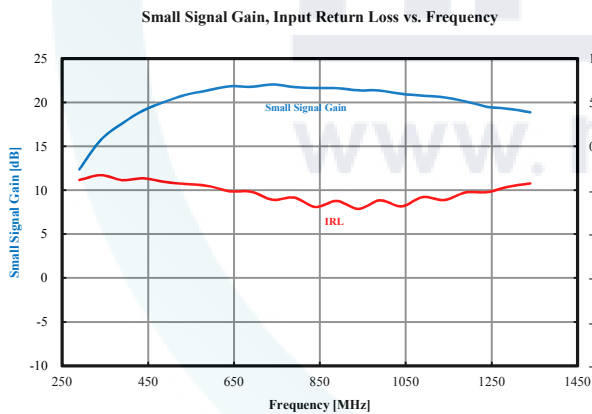
($T_c=25^\circ\text{C}$, Measured in the ETQ2014P-800MHz test board amplifier circuit)



2-tone Power = 39.5dBm, $V_{DS} = 48\text{V}$, $I_{DQ} = 50\text{mA}$

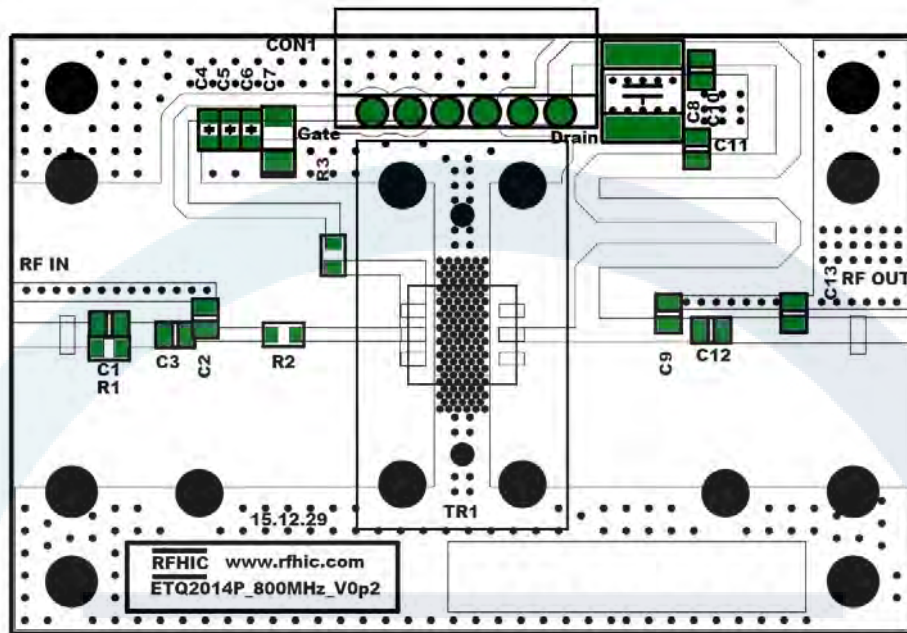
Typical Small Signal Performance

($T_c=25^\circ\text{C}$, Measured in the ETQ2014P-800MHz test board amplifier circuit)



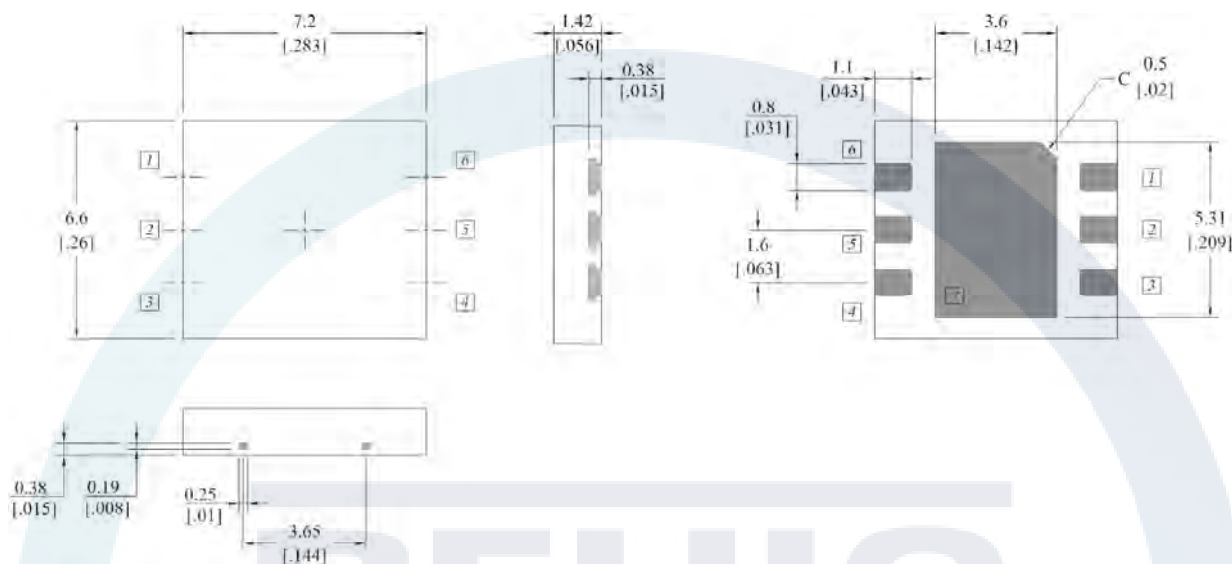
$P_{IN} = 0\text{dBm}$, $V_{DS} = 48\text{V}$, $I_{DQ} = 50\text{mA}$

Test Board Component Layout(800MHz)



Part	Description	Part Number	Manufacturer
R1	20 ohm Chip Resistor	MCR10EZPJ200	ROHM
R2	200 ohm Chip Resistor	MCR10EZPJ201	ROHM
R3	5.6 ohm Chip Resistor	MCR10EZPJ5R6	ROHM
C1	2.0pF High Q Capacitor	201CHA2R0CSLE	TEMEX
C2	1.3pF High Q Capacitor	201CHA1R3BSLE	TEMEX
C3, C10, C12	100pF High Q Capacitor	201CHA101JSLE	TEMEX
C4	10F Chip Capacitor	GRM1885C1H100JA01D	MURATA
C5	100F Chip Capacitor	GRM1885C1H101JA01D	MURATA
C6	1nF Chip Capacitor	GRM188R71H102KA01D	MURATA
C7	Polymer Capacitor	TCJA106M016R0200	AVX
C8	10uF MLCC	RS80R2A106M	MARUWA
C9, C13	-	-	-
C11	39pF High Q Capacitor	201CHA390JSLE	TEMEX
CON1	DC Connector	5268-06A	MOLEX
PCB	$\epsilon_r=3.66 \pm 0.05$, 0.030" (0.762mm)	RO4350B	ROGERS Corp.
TR1	14W GaN Transistor	ETQ2014P	RFHIC

Package Dimensions (Type:DFN66726L-Q2)



Pin Description	
Pin No	Function
1	N.C.
2	Gate
3	N.C.
4	N.C.
5	Drain
6	N.C.
7	Source

Revision History

Part Number	Release Date	Version	Description	Data Sheet Status
ETQ2014P	January, 2018	1.0	Initial release of datasheet	-



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