

Package Type : NS-AS01

Product Features

- 2110~2170MHz
- 110W Saturated Power @ 48V
- 74% Drain Efficiency @ Psat
- 38% Drain Efficiency @ 44dBm
- Internally Matched

Applications

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

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

Frequency [MHz]	Peak Power		Average Power ^{*1}			
	Power [W]	Drain Efficiency [%]	Power [W]	Gain [dB]	Drain Efficiency [%]	ACLR [dBc]
2115.0	136.1	74.4	25	18.3	39.0	-33.7
2140.0	131.8	75.4	25	18.4	38.9	-32.7
2165.0	126.8	75.3	25	18.2	38.5	-31.9

Note

*1 Measured in the IE21110P 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}	16	mA	$T_C = 25^\circ C$
Maximum Drain Current ^{*1}	I_{DMAX}	6	A	$T_C = 25^\circ C$
Power Dissipation	P_{DISS}	55	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	$R_{\theta JC}$	2.55 ^{*1}	$^\circ C/W$	$T_C = 85^\circ C$

Note

*1 Measured for the IE21110P at dissipation power of 55W.

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 = 14.4mA					
Gate Quiescent Voltage	V _{DS} = 48V	V _{GS(Q)}	-	-2.4	-	V _{DC}
	I _D = 500mA					
Saturated Drain Current ^{*2}	V _{DS} = 6V	I _{DS}	12.0	14.4	-	A
	V _{GS} = 2V					
Drain-Source Breakdown Voltage	V _{GS} = -8V	V _{BR}	150	-	-	V
	I _D = 14.4mA					
Gate Leakage Current	V _{GS} = -8V	I _{GLKG}	-3.2	-	-	mA
	V _{DS} = 120V					
Drain Leakage Current	V _{GS} = -8V	I _{DLKG}	-	-	5.8	mA
	V _{DS} = 120V					
RF Characteristics (Fc=2140MHz unless otherwise noted)						
Saturated Output Power ^{*3,6}	V _{DS} = 48V	P _{SAT}	-	110	-	W
	I _{DQ} = 500mA					
Pulsed Drain Efficiency ^{*3}	V _{DS} = 48V	η	69	74	-	%
	I _{DQ} = 500mA					
	P _{OUT} = P _{SAT} Pulsed					
Modulated Gain ^{*4}	V _{DS} = 48V	G _{BR}	17.0	18.0	-	dB
	I _{DQ} = 500mA					
	P _{OUT} = 44dBm					
LTE Linearity ^{*4}	V _{DS} = 48V	ACLR	-	-32.0	-28.0	dBc
	I _{DQ} = 500mA					
	P _{OUT} = 44dBm					
Modulated Drain Efficiency ^{*4}	V _{DS} = 48V	η	34.0	38.0	-	%
	I _{DQ} = 500mA					
	P _{OUT} = 44dBm					
Output Mismatch Stress ^{*3, 5}	V _{DS} = 48V	VSWR	-	-	10:1	ψ
	I _{DQ} = 500mA					
	P _{OUT} = P _{SAT} Pulsed					

Note

*1 Measured on wafer prior to packaging.

*2 Scaled from PCM data.

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

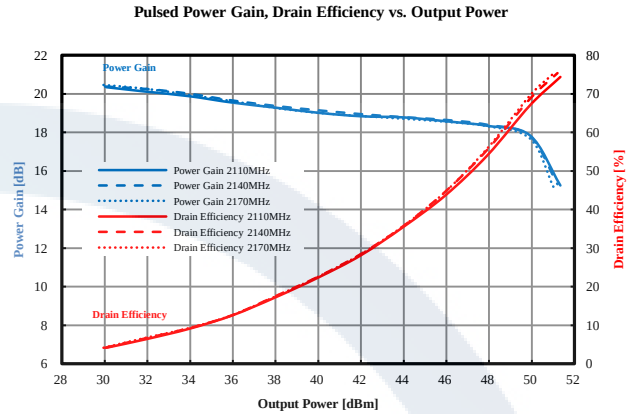
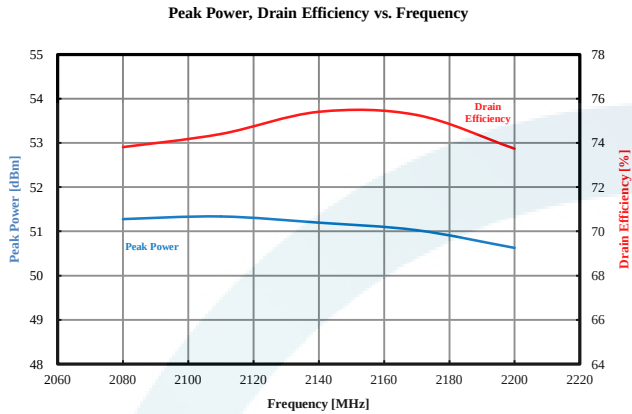
*4 Measured in the IE21110P test board amplifier circuit, under LTE 10MHz, PAR7.5dB @0.01% probability on CCDF.

*5 Measured in the IE21110P 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.

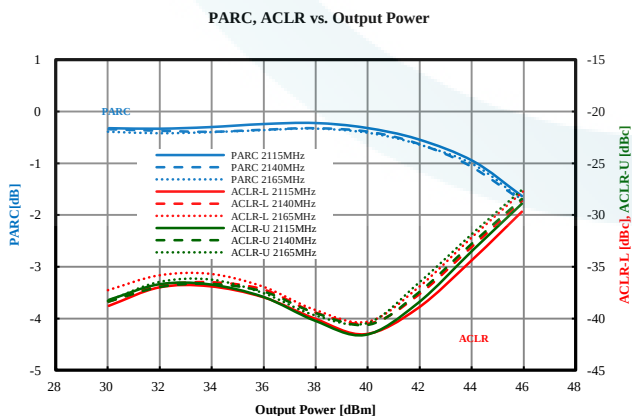
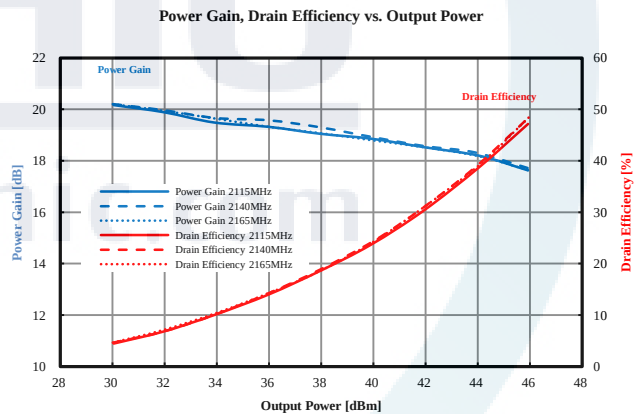
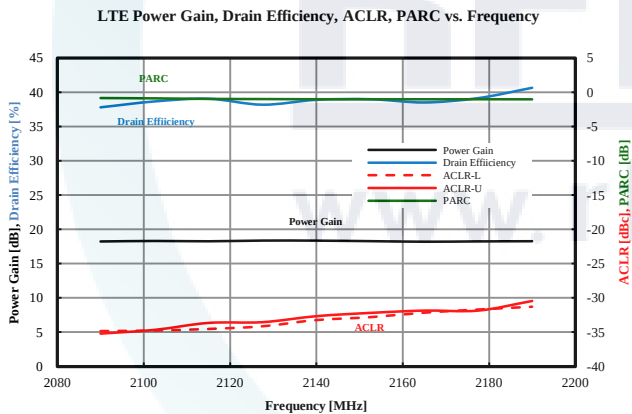
Typical Pulsed Signal Performance

(Tc=25°C, Measured in the IE21110P test board amplifier circuit)


 $V_{DS} = 48V, \quad I_{DQ} = 500mA, \quad \text{Pulse Width} = 100\mu\text{sec}, \quad \text{Duty Cycle} = 10\%$

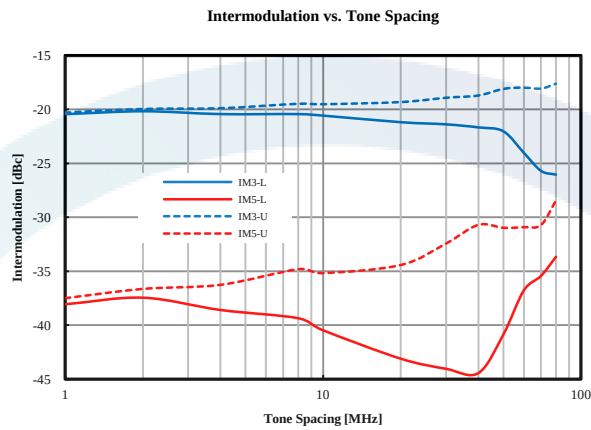
Typical LTE Signal Performance

(Tc=25°C, Measured in the IE21110P test board amplifier circuit)


 $P_{AVG} = 44dBm, \quad V_{DS} = 48V, \quad I_{DQ} = 500mA$
 LTE 10MHz BW, PAPR=7.5dB @ 0.01% Probability on CCDF

Typical 2-tone Intermodulation Imbalance Performance

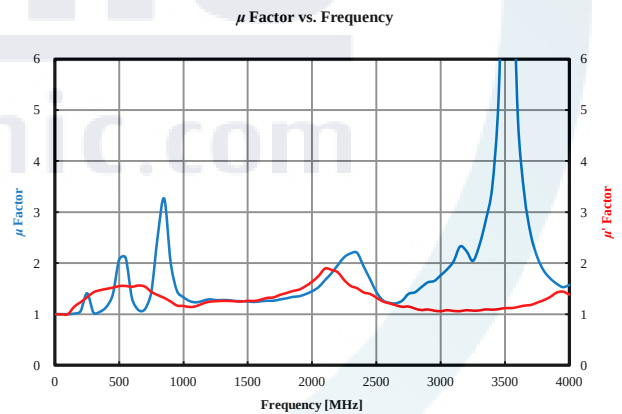
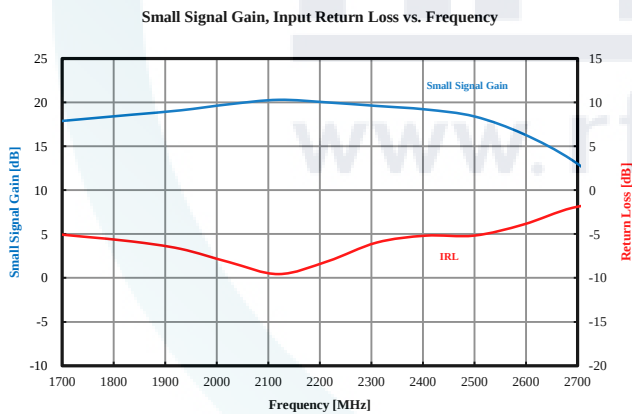
($T_c=25^\circ\text{C}$, Measured in the IE21110P test board amplifier circuit)



2-tone Power = 48.4dBm, $V_{DS} = 48\text{V}$, $I_{DQ} = 500\text{mA}$

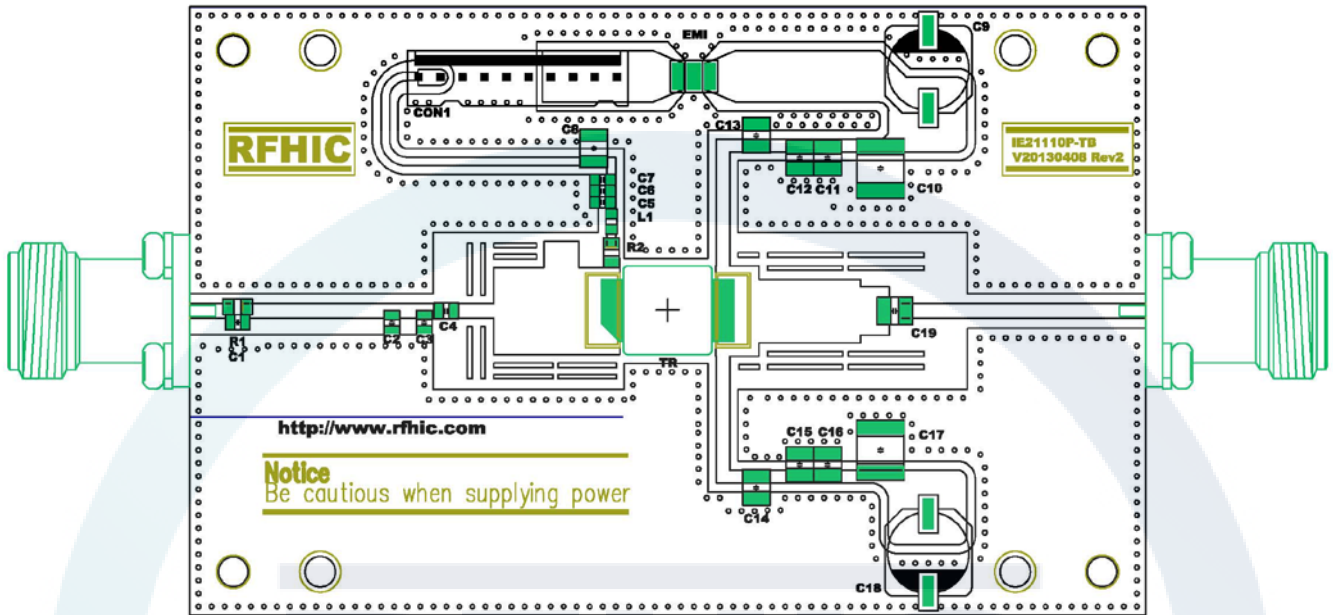
Typical Small Signal Performance

($T_c=25^\circ\text{C}$, Measured in the IE21110P test board amplifier circuit)



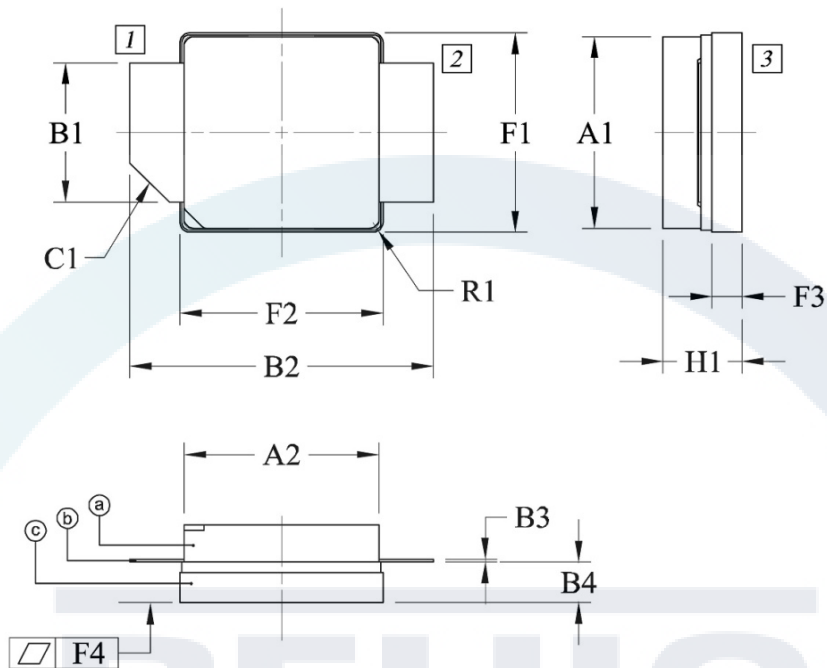
$P_{IN} = 0\text{dBm}$, $V_{DS} = 48\text{V}$, $I_{DQ} = 500\text{mA}$

Test Board Component Layout



Part	Description	Part Number	Manufacturer
R1,R2	10ohm Chip Resistor	MCR10EZHZJ100	ROHM
L1	22nH Wire Wound Inductor	LQW18AN22NG00	MURATA
C1	10pF High Q Capacitor	201CHA100JSLE	TEMEX
C2	1pF High Q Capacitor	201CHA1R0BSL	TEMEX
C3	1.2pF High Q Capacitor	201CHA1R2BSLE	TEMEX
C4	12pF High Q Capacitor	201CHA120JSLE	TEMEX
C5	10pF Chip Capacitor	GRM1885C1H100JA01D	MURATA
C6	10nF Chip Capacitor	GRM188R71H103KA01D	MURATA
C7	100nF Chip Capacitor	GRM188R71H104KA93D	MURATA
C8	Polymer Capacitor	TCJB476M010R0070	AVX
C9,C18	33uF Aluminum Capacitor	BDS100VC33MJ10TP	SAMYOUNG
C10,C17	10uF MLCC	RS80R2A106M	MARUWA
C11,C16	100pF High Q Capacitor	501CHB101JSLE	TEMEX
C12,C13,C14,C15	22pF High Q Capacitor	501CHB220JSLE	TEMEX
C19	12pF High Q Capacitor	501CHB120JSLE	TEMEX
EMI	EMI FILTER	CTH32R102S20A-TM	MARUWA
CON1	DC Connector	22-04-1101	MOLEX
PCB	$\epsilon_r=3.66 \pm 0.05$, 0.030" (0.762mm)	RO4350B	ROGERS Corp.
TR	110W GaN Transistor	IE21110P	RFHIC

Package Dimensions (Type: NS-AS01)



Pin Description	
Pin No	Function
1	Gate
2	Drain
3	Source

- (a)- Lid
 (b)- Lead Frame
 (c)- Flange

Dim.	INCH			MILLIMETER		
	MIN	TYP	MAX	MIN	TYP	MAX
A1	.380	.384	.390	9.65	9.75	9.90
A2	.380	.384	.390	9.65	9.75	9.90
B1	.274	.280	.285	6.97	7.10	7.23
B2	.579	.598	.618	14.70	15.20	15.70
B3	.004	.005	.007	0.10	0.13	0.18
B4	.080	.085	.090	2.03	2.15	2.28
C1 (Chamfer)	.075	.079	.083	1.90	2.00	2.10
F1	.395	.400	.405	10.03	10.16	10.29
F2	.395	.400	.405	10.03	10.16	10.29
F3	.054	.059	.064	1.37	1.50	1.63
F4	-	.001	-	-	0.03	-
H1	.148	.159	.167	3.75	4.05	4.25
L1	-	-	-	-	-	-
L2	-	-	-	-	-	-
R1 (Radius)	.016	.020	.024	0.40	0.50	0.60

Revision History

Part Number	Release Date	Version	Description	Data Sheet Status
IE21110P	April, 2016	1.1	Modified Thermal Characteristics	-
IE21110P	February, 2015	1.0	Initial Release of Data sheet	-



RFHIC Corporation reserves the right to make changes to any products herein or to discontinue any product at any time without notice. While product specifications have been thoroughly examined for reliability, RFHIC Corporation strongly recommends buyers to verify that the information they are using is accurate before ordering. RFHIC Corporation does not assume any liability for the suitability of its products for any particular purpose, and disclaims any and all liability, including without limitation consequential or incidental damages.

RFHIC products are not intended for use in life support equipment or application where malfunction of the product can be expected to result in personal injury or death. Buyer uses or sells such products for any such unintended or unauthorized application, buyer shall indemnify, protect and hold RFHIC Corporation and its directors, officers, stockholders, employees, representatives and distributors harmless against any and all claims arising out of such unauthorized use.

Sales, inquiries and support should be directed to the local authorized geographic distributor for RFHIC Corporation. For customers in the US, please contact the US Sales Team at +1-919-677-8780. For all other inquiries, please contact the International Sales Team at 82-31-8069-3036 or Korean Domestic Sales Team 82-31-8069-3034.