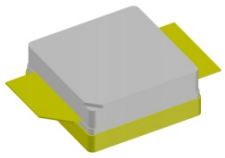
Product Features

- 2400 ~ 2500MHz (ISM band)
- 170W CW Psat @ 50V
- 72% Drain Efficiency @ 50V
- Excellent Ruggedness
- Excellent Thermal Stability
- Internally Matched

Applications

- Industrial Heating and Drying
- Scientific
- Medical : Skin Treatment, Blood Therapy
- Plasma Lighting



Package Type : NS-DS01

Description

The 150W CW RF Power Transistor is designed for Industrial, Scientific, Medical (ISM) and Plasma Lighting applications at 2450MHz. This device is suitable for use in CW, pulse and linear applications. This high efficiency rugged device is targeted to replace Industrial magnetrons and other vacuum tubes currently powering industrial heating, drying, plasma lighting and medical systems.

Typical CW Peak Power Performance (V_{DS}=+50V, Tc=25°C, 50Ω)

Frequency [MHz]	Signal Type	Pin [W]	Power Gain [dB]	Drain Efficiency [%]	Pout [W]
2400.0	CW	7.7	13.8	73.3	186.7
2450.0		8.4	13.3	73.3	178.3
2500.0		9.6	12.5	72.1	172.9

Absolute Maximum Ratings

Rating	Symbol	Value	Unit	Condition
Drain to Source Voltage	V_{DSS}	150	V	Tc=25°C
Gate to Source Voltage	V_{GS}	-10, +2	V	Tc=25°C
Operating Voltage	V_{DD}	52	V_{DC}	-
Maximum Forward Gate Current	I_{GMAX}	24	mA	Tc=25°C
Maximum Drain Current[*1]	I_{DMAX}	9	A	Tc=25°C
Power Dissipation	P_{DISS}	90.5	W	Tc=85°C
Storage Temperature	T_{STG}	-65, +150	°C	-
Case Operating Temperature	T_C	-40, +150	°C	-
Operating Junction Temperature[*2]	T_J	225	°C	-
Soldering Temperature[*3]	T_S	245	°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	$R_{\theta JC}$	1.54 [*1]	°C/W	Tc=85°C

Note
*1 Measured for the IE24150P at dissipation power is 90.5W

Electrical Characteristics (Tc=25℃ unless otherwise noted)

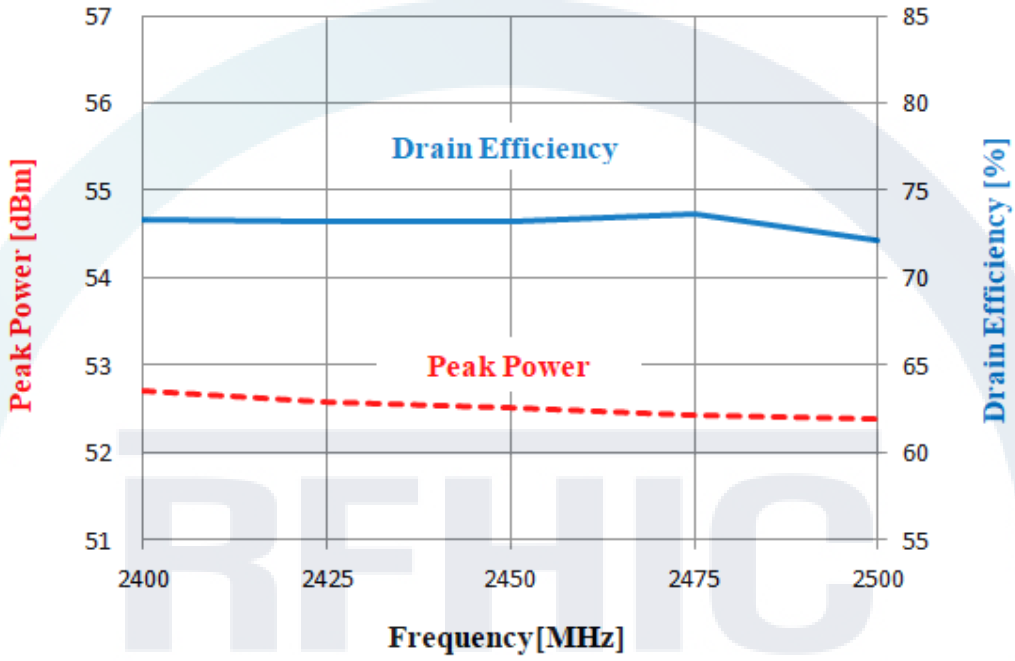
Characteristics	Conditions	Symbol	Min	Typ	Max	Unit
DC Characteristics[*1]						
Gate Threshold Voltage	**V_{DS} = 10V** **I_D = 21.6mA**	$V_{GS(TH)}$	-3.8	-3.0	-2.3	V_{DC}
Gate Quiescent Voltage	**V_{DS} = 50V** **I_D = 50mA**	$V_{GS(Q)}$	-	-3.2	-	V_{DC}
Saturated Drain Current[*2]	**V_{DS} = 6V** **V_{GS} = 2V**	I_{DS}	18.0	21.6	-	A
Drain-Source Breakdown Voltage	**V_{GS} = -8V** **I_D = 21.6mA**	V_{BR}	150	-	-	V
Gate Leakage Current	**V_{GS} = -8V** **V_{DS} = 120V**	I_{GLKG}	-4.8	-	-	mA
Drain Leakage Current	**V_{GS} = -8V** **V_{DS} = 120V**	I_{DLKG}	-	-	8.6	mA
RF Characteristics (Fc = 2450MHz unless otherwise noted)						
Saturated Output Power[*3]	**V_{DS} = 50V** **I_{DQ} = 50mA**	P_{SAT}	150	170	-	W
CW Drain Efficiency[*3]	**V_{DS} = 50V** **I_{DQ} = 50mA** **P_{OUT} = P_{SAT} CW**	η	69	73	-	%
Output Mismatch Stress[*4, 5]	**V_{DS} = 50V** **I_{DQ} = 50mA** **P_{OUT} = P_{SAT} Pulsed**	VSWR	-	-	10:1	ψ

Note
*1 Measured on wafer prior to packaging.
*2 Scaled from PCM data.
*3 CW(Continuous Wave) signal operation condition.
*4 Pulse width 100usec, Duty Cycle 10%.
*5 Measured in the IE24150P-2450MHz test board amplifier circuit, No damage at all phase angles.

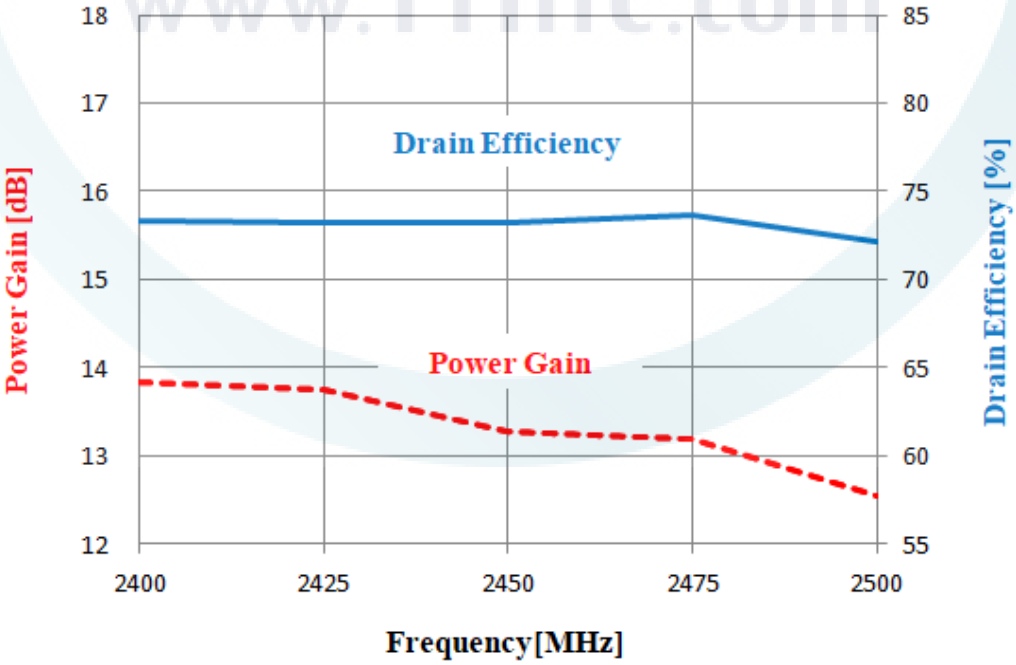
Typical CW Performance Charts

* **Bias condition** (I_{DQ}=50mA @ V_{DS}=50V, Tc=25℃)

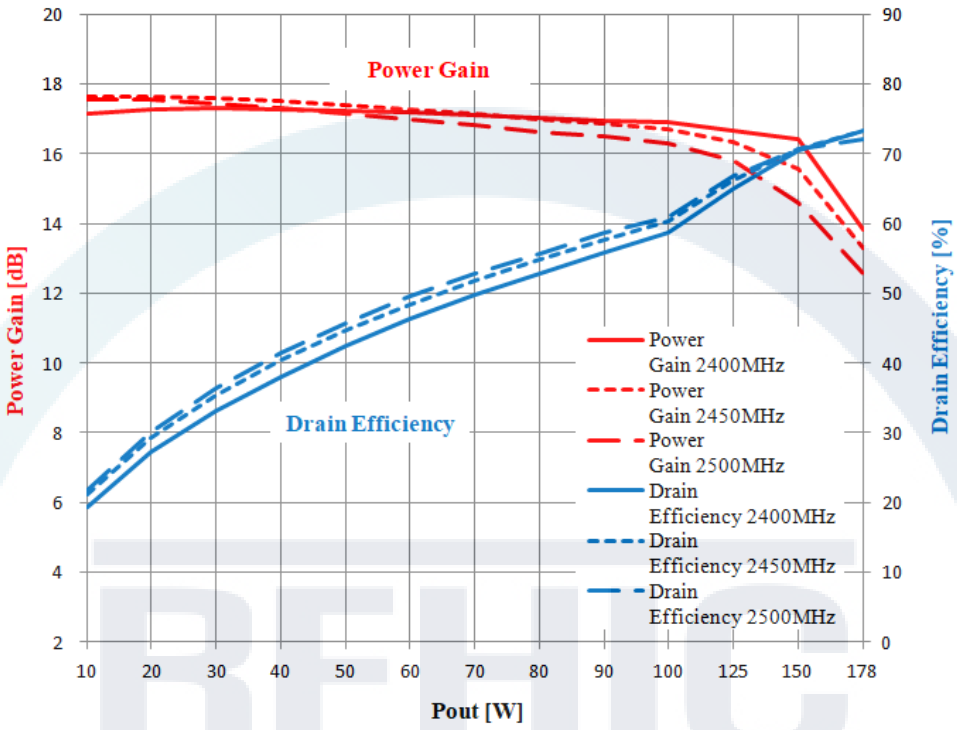
Peak Power, Drain Efficiency vs. Frequency



Power Gain, Drain Efficiency vs. Frequency



Power Gain, Drain Efficiency vs. Output Power



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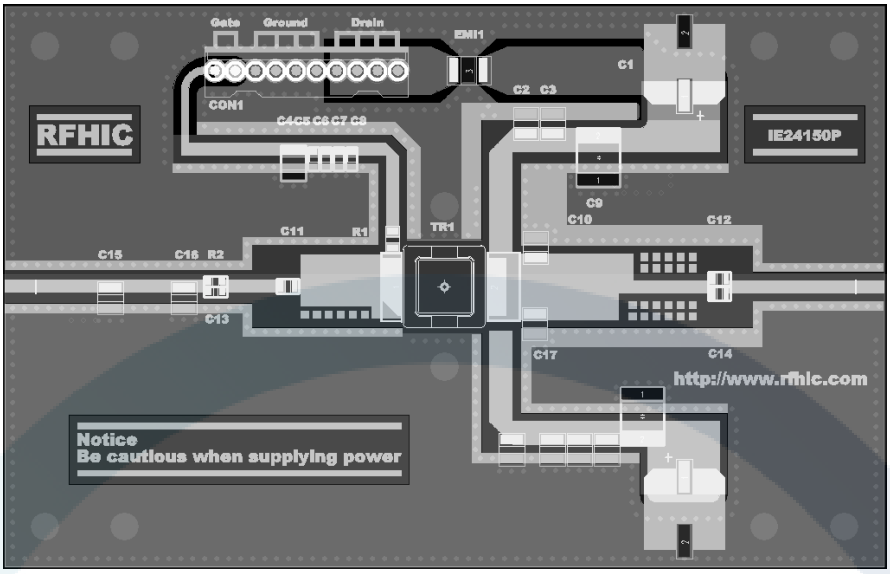
Application Circuit



Part List

Part	Description	Part Number	Manufacturer
R1	10 Ohm Chip Resistor, 2012	MCR10EZHJ100	ROHM
R2	10 Ohm Chip Resistor, 1608	MCR03EZPJ100	ROHM
C1	33uF Aluminum Capacitor	BDS100VC33MJ10TP	SAMYOUNG
C2	10pF High Q Capacitor	501CHB100JSLE	TEMEX
C3	100pF High Q Capacitor	501CHB101JSLE	TEMEX
C4	10uF, 16V MLCC	C3216X7R1C106K	TDK
C5	100nF Chip Capacitor	GRM188R71H104KA93D	MURATA
C6	1nF Chip Capacitor	GRM188R71H102KA01D	MURATA
C7	100pF Chip Capacitor	GRM1885C1H101JA01D	MURATA
C8	10pF Chip Capacitor	GRM1885C1H100JA01D	MURATA
C9	10uF, 100V MLCC	RS80R2A106M	MARUWA
C10, C15, C16, C17	0.5pF High Q Capacitor	501CHB0R5BSLE	TEMEX
C11	3pF High Q Capacitor	201CHA3R0CSLE	TEMEX
C12, C14	0.7pF High Q Capacitor	201CHA0R7BSLE	TEMEX
C13	10pF High Q Capacitor	201CHA100JSLE	TEMEX
EMI1	EMI FILTER	CTH32R102S20A-TM	MARUWA
CON1	DC Connector	22-04-1101	MOLEX
PCB	εr=3.5 ± 0.05, 0.030” (0.762mm)	RF-35TC	TACONIC.
TR1	150W GaN Transistor	IE24150P	RFHIC

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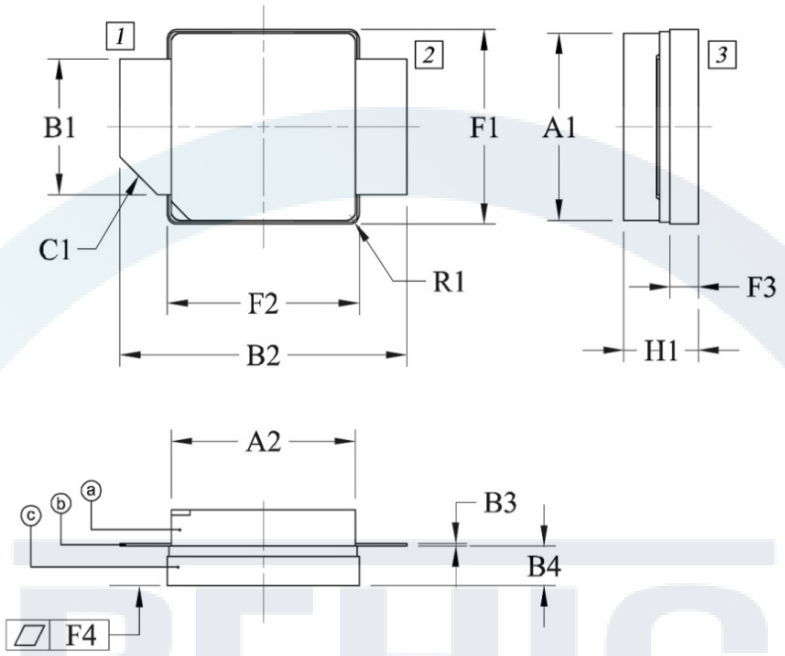
Package Dimensions (Type : NS-DS01)

* Unit: mm[inch] | Tolerance ±0.15 [.006]



Pin Description	
Pin No	Function
1	Gate
2	Drain
3	Source

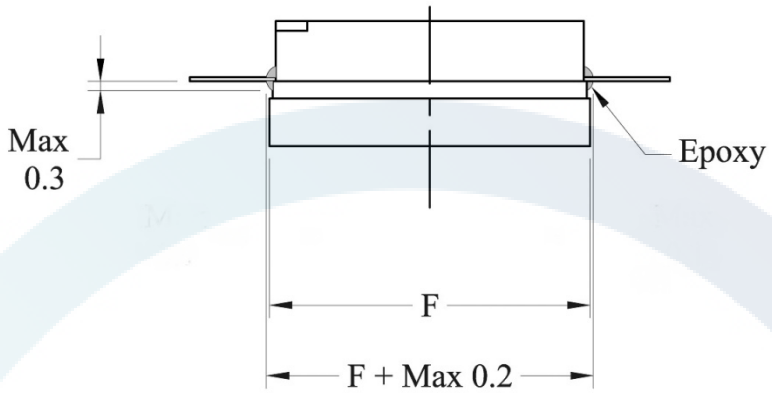
ⓐ- Lid

ⓑ- Lead Frame

ⓒ- 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

Sealing Epoxy Tolerance (Type : NS-DS01)



Note
Unit : mm
F is maximum size of flange

Revision History

Part Number	Release Date	Version	Description	Data Sheet Status
IE24150P	April, 2017	0.1	Initial Release of DataSheet	Preliminary
IE24150P	October, 2017	1.0	Revision : Update Test Data	Final