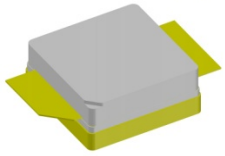
# IE09300PC

## Product Features

- 900 ~ 930MHz (ISM band)
- 330W CW Peak Power @ 50V
- 80% 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-AS01

## Description

The 300W CW RF Power Transistor is designed for Industrial, Scientific, Medical (ISM) and Plasma Lighting applications at 915MHz. 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] |
|---|---|---|---|---|---|
| 910 | CW | 6.6 | 17.1 | 80.01 | 343 |
| 915 | | 5.3 | 18 | 80.21 | 339 |
| 920 | | 5.6 | 17.7 | 81.58 | 336 |

## 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 | $I_{GMAX}$ | 41.8 | mA | Tc=25°C |
| Maximum Drain Current*1 | $I_{DMAX}$ | 18 | A | Tc=25°C |
| Power Dissipation | $P_{DISS}$ | 165 | 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 | $R_{\theta JC}$ | 0.85 *1 | °C/W | Tc=85°C |

**Note**
*1 Measured for the IE24300P at dissipation power is 165W

## Electrical Characteristics (Tc=25℃ unless otherwise noted)

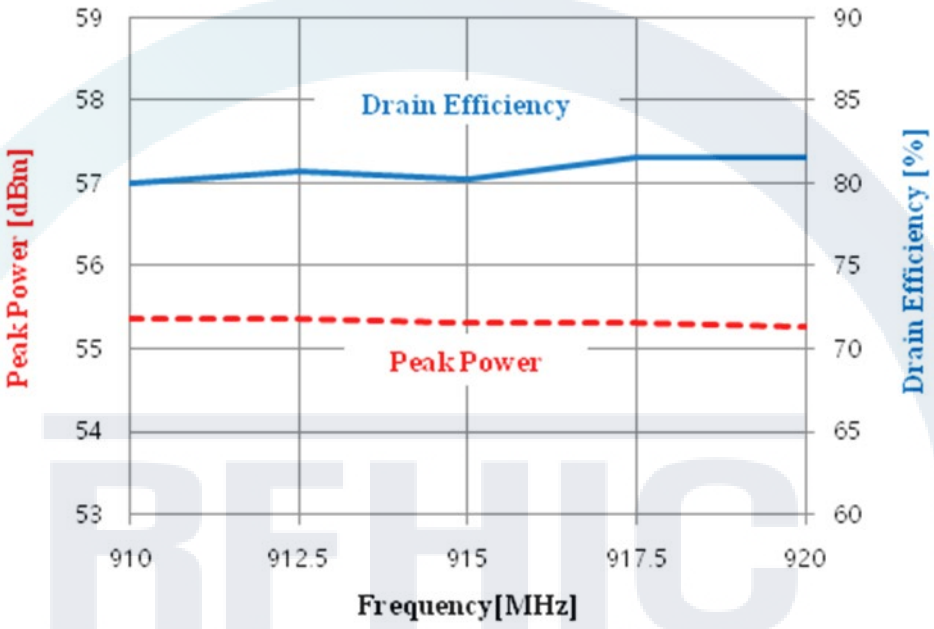
| Characteristics | Conditions | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **DC Characteristics**[*1] | | | | | | |
| **Gate Threshold Voltage** | **$V_{DS}$ = 10V**<br>**$I_D$ = 41.8mA** | $V_{GS(TH)}$ | -3.8 | -3.0 | -2.3 | $V_{DC}$ |
| **Gate Quiescent Voltage** | **$V_{DS}$ = 50V**<br>**$I_D$ = 50mA** | $V_{GS(Q)}$ | - | -3.2 | - | $V_{DC}$ |
| **Saturated Drain Current**[*2] | **$V_{DS}$ = 6V**<br>**$V_{GS}$ = 2V** | $I_{DS}$ | 34.8 | 41.8 | - | A |
| **Drain-Source Breakdown Voltage** | **$V_{GS}$ = -8V**<br>**$I_D$ = 41.8mA** | $V_{BR}$ | 150 | - | - | V |
| **Gate Leakage Current** | **$V_{GS}$ = -8V**<br>**$V_{DS}$ = 120V** | $I_{GLKG}$ | -9.2 | - | - | mA |
| **Drain Leakage Current** | **$V_{GS}$ = -8V**<br>**$V_{DS}$ = 120V** | $I_{DLKG}$ | - | - | 16.7 | mA |
| **RF Characteristics** (Fc = 2450MHz unless otherwise noted) | | | | | | |
| **Saturated Output Power**[*3] | **$V_{DS}$ = 50V**<br>**$I_{DQ}$ = 150mA** | $P_{SAT}$ | 300 | 330 | - | W |
| **CW Drain Efficiency**[*3] | **$V_{DS}$ = 50V**<br>**$I_{DQ}$ = 150mA**<br>**$P_{OUT}$ = $P_{SAT}$ CW** | η | 77 | 80 | - | % |

**Note**
*1 Measured on wafer prior to packaging.
*2 Scaled from PCM data.
*3 CW(Continuous Wave) signal operation condition.

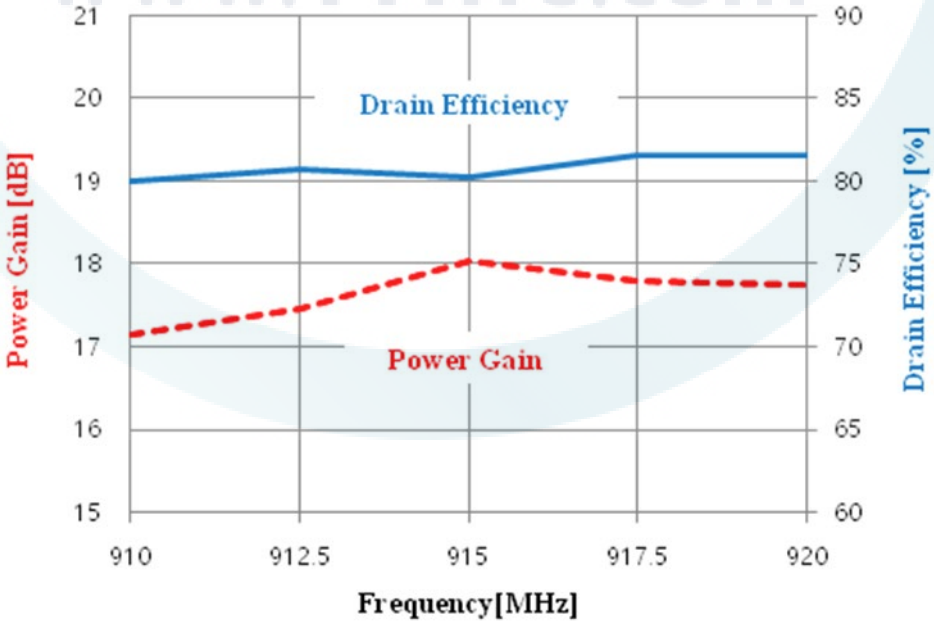
## Typical CW Performance Charts

*** Bias condition** ($I_{DQ}$=150mA @ $V_{DS}$=50V, Tc=25℃)

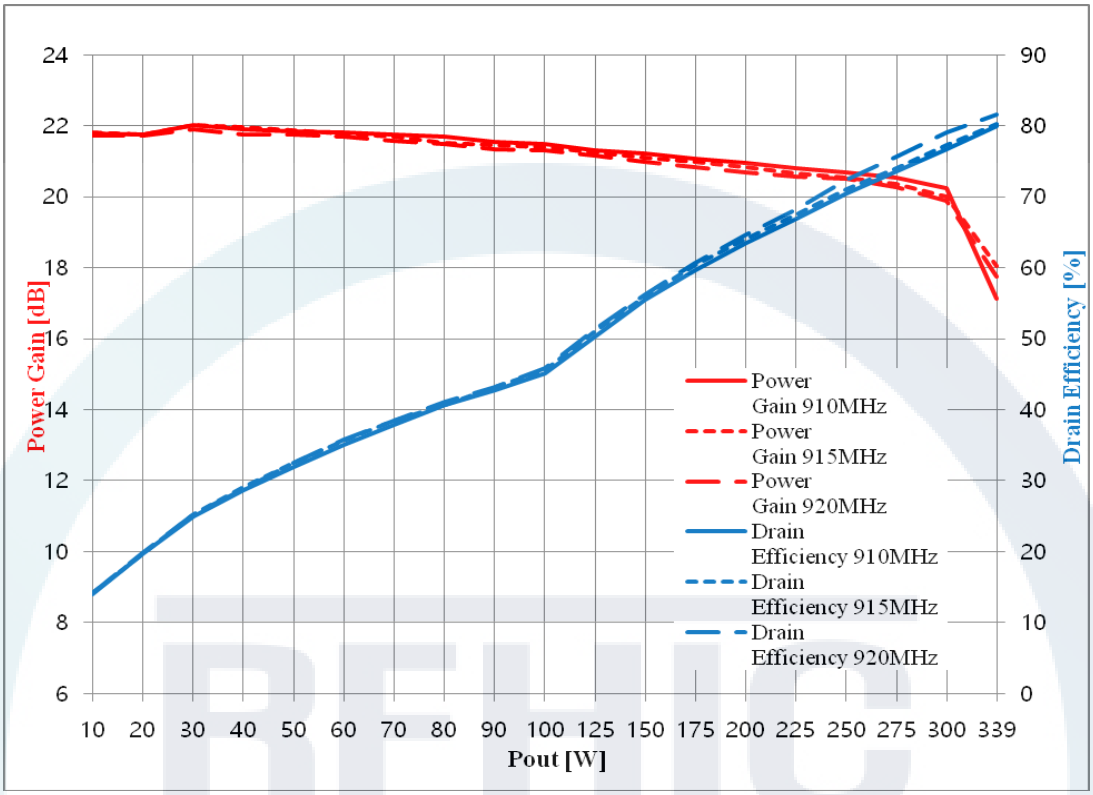
**Peak Power, Drain Efficiency vs. Frequency**




**Power Gain, Drain Efficiency vs. Frequency**



**Power Gain, Drain Efficiency vs. Output Power**

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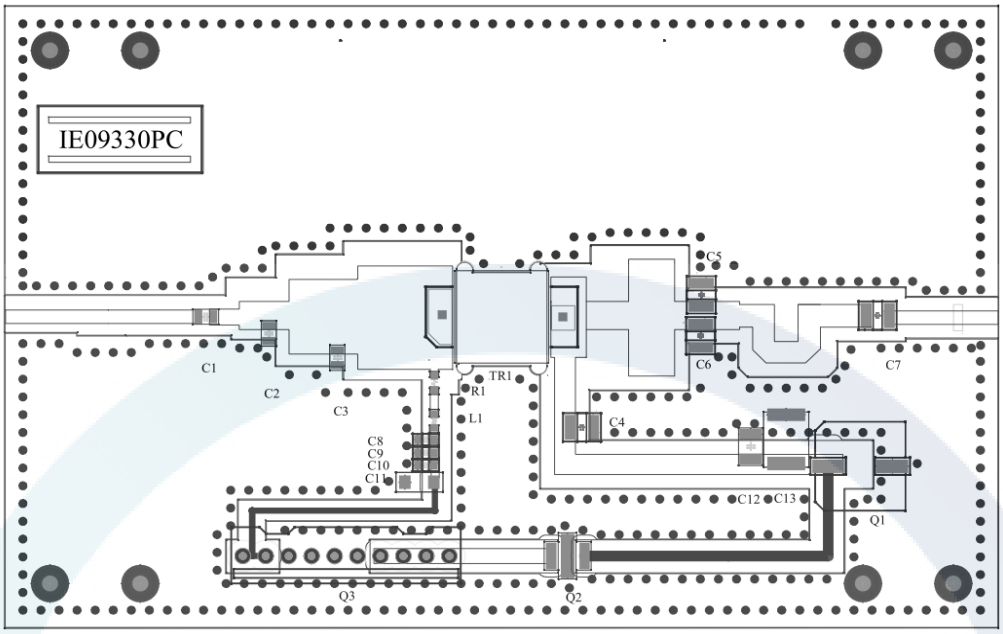
## Application Circuit




## Part List

| Part | Description | Part Number | Manufacturer |
|---|---|---|---|
| **L1** | 18nH Chip Inductor | LL1608-FSL18NJ | TOKO |
| **R1** | 10 Ohm Chip Resistor, 2012 | MCR10EZHJ100 | ROHM |
| **C1** | 100pF High Q Capacitor | 201 CHA 101 JSLE | TEMEX |
| **C2** | 3.9pF High Q Capacitor | 201 CHA 3R9 CSLE | TEMEX |
| **C3** | 6.8pF High Q Capacitor | 201 CHA 6R8 CSLE | TEMEX |
| **C4, C12** | 100pF High Q Capacitor | 501 CHB 101 JSLE | TEMEX |
| **C5** | 4.7pF High Q Capacitor | 501 CHB 4R7 CSLE | TEMEX |
| **C6** | 2.7pF High Q Capacitor | 501 CHB 2R7 CSLE | TEMEX |
| **C7** | 15pF High Q Capacitor | 501 CHB 150 JSLE | TEMEX |
| **C8** | 100pF Chip Capacitor | GRM1885C1H101JA01D | MURATA |
| **C9** | 1nF Chip Capacitor | GRM188R71H102KA01D | MURATA |
| **C10** | 100nF Chip Capacitor | GRM188R71H104KA93D | MURATA |
| **C11** | 10uF, 16V MLCC | C3216X7R1C106K | TDK |
| **C13** | 10uF, 100V MLCC | CKG57NX7R2A106MT | TDK |
| **Q1** | 33uF Aluminum Capacitor | BDS100VC33MJ10TP | SAMYOUNG |
| **Q2** | EMI FILTER | CTH32R102S20A-TM | MARUWA |
| **Q3** | DC Connector | 22-04-1101 | MOLEX |
| **PCB** | εr=3.5 ± 0.05, 0.030" (0.762mm) | RF-35TC | TACONIC. |
| **TR1** | 300W GaN Transistor | IE09300PC | RFHIC |

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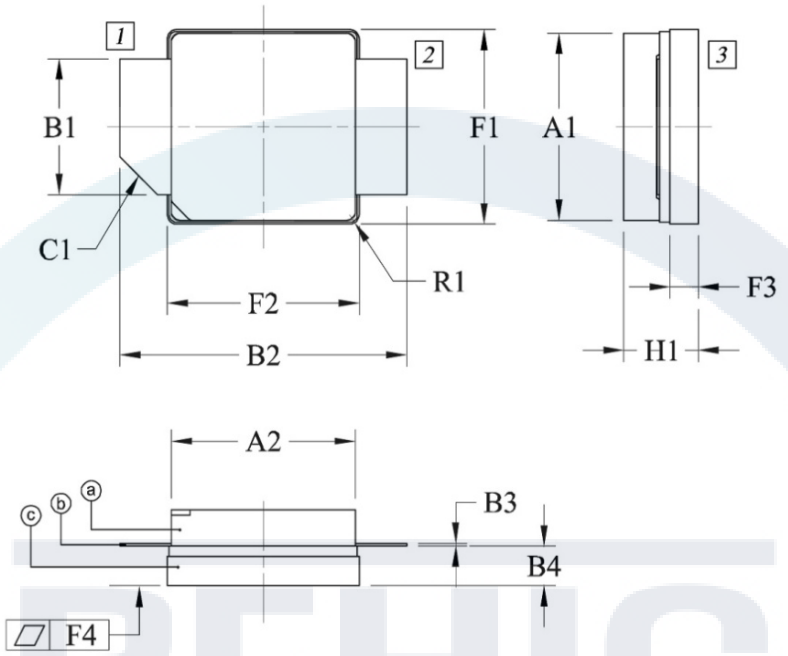
## Package Dimensions (Type: NS-AS01)

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

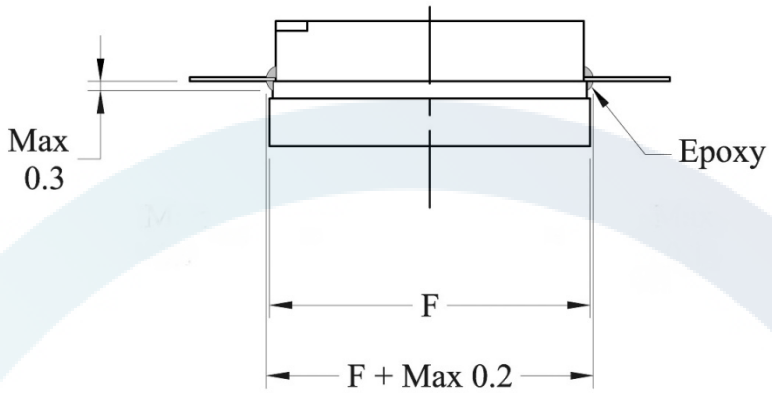



| Pin Description | |
|---|---|
| Pin No | Function |
| 1 | Gate |
| 2 | Drain |
| 3 | Source |

ⓐ- 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-AS01)




**Note**
Unit : mm
F is maximum size of flange

## Revision History

| Part Number | Release Date | Version | Description | Data Sheet Status |
|---|---|---|---|---|
| IE09300PC | NOV, 2019 | 0.2 | Modify Frequency | Preliminary |
| IE09300PC | AGU, 2017 | 0.1 | Initial Release of DataSheet | Preliminary |
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