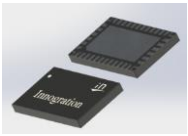
# 25W,12.5V High Power RF LDMOS FETs

**ITEH09075C6**



## Description

The ITEH09075C6 is a 25-watt, highly rugged, unmatched LDMOS FET, designed for commercial and industrial applications at frequencies up to 1GHz. It can be used in linear or saturated power amplifier, for CW and pulsed signal, and any modulation format.

It is also featured by its lower cost of plastic open cavity for surface mount on PCB through vias

- Typical LMR UHF CW Performance (On Innogration fixture with device soldered).

| Condition: $V_{ds}$= 12.5V, $I_{dq}$=300mA, $V_{gs}$=2.70V | | | | | |
|---|---|---|---|---|---|
| **Freq (MHz)** | **P1(dBm)** | **P1 Gain（dB）** | **P3dB(dBm)** | **P3dB(W)** | **EFF (%)** |
| **400** | **43.60** | **19.02** | **44.69** | **29.5** | **48.3** |
| **410** | **44.27** | **18.86** | **45.31** | **33.9** | **51.6** |
| **420** | **44.68** | **19.29** | **45.73** | **37.4** | **54.2** |
| **430** | **45.14** | **20.09** | **46.11** | **40.8** | **57.4** |
| **440** | **45.03** | **20.82** | **46.11** | **40.8** | **58.5** |
| **450** | **44.31** | **20.97** | **45.62** | **36.5** | **56.8** |
| **460** | **43.49** | **20.17** | **45.21** | **33.2** | **53.9** |
| **470** | **42.59** | **19.94** | **45.21** | **33.2** | **54.7** |
| **480** | **43.06** | **19.38** | **44.56** | **28.6** | **55.5** |

- Typical 900MHz CW Performance (On Innogration fixture with device soldered).

Vds= 12.5V, Idq=100mA(Vgs=3.30V)

| Freq | P1dB | P1dB | P1dB Eff | P1dB Gain | P3dB | P3dB | P3dB Eff |
|---|---|---|---|---|---|---|---|
| (MHz) | (dBm) | (W) | % | dB | (dBm) | (W) | % |
| 902 | 42.74 | 18.8 | 58.1 | 18.57 | 44.38 | 27.4 | 66.5 |
| 915 | 42.46 | 17.6 | 61.8 | 18.58 | 44.02 | 25.2 | 69.9 |
| 928 | 42.01 | 15.9 | 63.8 | 18.31 | 43.37 | 21.7 | 69.7 |

## Features

- High Efficiency and Linear Gain Operations
- Integrated ESD Protection
- Excellent thermal stability, low HCI drift
- Large Positive and Negative Gate/Source Voltage Range for Improved Class C Operation
- Pb-free, RoHS-compliant

## Suitable Applications

- VHF/UHF Land mobile radio (LMR)
- RF Energy application at ISM bands

**Table 1. Maximum Ratings**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain--Source Voltage | $V_{DSS}$ | +70 | Vdc |
| Gate--Source Voltage | $V_{GS}$ | -10 to +10 | Vdc |

| | | | |
|---|---|---|---|
| Operating Voltage | $V_{DD}$ | +28 | Vdc |
| Storage Temperature Range | Tstg | -65 to +150 | °C |
| Case Operating Temperature | $T_C$ | +150 | °C |
| Operating Junction Temperature | $T_J$ | +225 | °C |

**Table 2. Thermal Characteristics**

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case<br>$T_C$= 85°C, $T_J$=200°C, DC test | RθJC | 0.8 | °C/W |

**Table 3. ESD Protection Characteristics**

| Test Methodology | Class |
|---|---|
| Human Body Model (per JESD22--A114) | Class 1B |

**Table 4. Electrical Characteristics** (TA = 25 ℃ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **DC Characteristics** | | | | | |
| Drain-Source Voltage<br>$V_{GS}$=0, $I_{DS}$=100uA | $V_{(BR)DSS}$ | | 70 | | V |
| Zero Gate Voltage Drain Leakage Current<br>($V_{DS}$ = 13.6V, $V_{GS}$ = 0 V) | $I_{DSS}$ | —— | —— | 1 | μA |
| Gate--Source Leakage Current<br>($V_{GS}$ = 9 V, $V_{DS}$ = 0 V) | $I_{GSS}$ | —— | —— | 1 | μA |
| Gate Threshold Voltage<br>($V_{DS}$ = 12.5V, $I_D$ = 600 μA) | $V_{GS(th)}$ | —— | 2 | —— | V |
| Gate Quiescent Voltage<br>($V_{DD}$ = 12.5V, $I_D$ = 300mA, Measured in Functional Test) | $V_{GS(Q)}$ | —— | 2.7 | —— | V |

**Load Mismatch (In Innogration Test Fixture, 50 ohm system):** $V_{DD}$ = 12.5Vdc, $I_{DQ}$ = 300 mA, f = 1000 MHz

| | |
|---|---|
| VSWR 10:1 at 25W pulse CW Output Power | No Device Degradation |

**Figure 1:Pin Definition(Top View)**


| Pin No. | Symbol | Description |
|---|---|---|
| 1-7,12,13,18-25,30,31,36 | GND | DC/RF Ground |
| 8,9,10,11,14,15,16,17 | Vgs/RF In | Vgs and RF input |
| 26,27,28,29,32,33,34,35 | Vds/RF out | Vds and RF output |
| Package Base | GND | DC/RF Ground. |

## 400-480MHz broadband
## Reference Circuit of Test Fixture Assembly Diagram

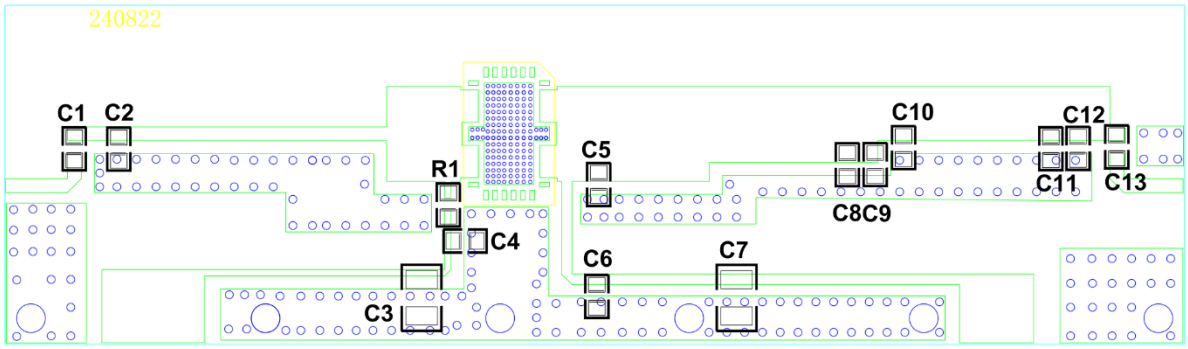



**Figure 2. Test Circuit Component Layout**

**Table 5. Test Circuit Component Designations and Values**

| Component | Description | Suggestion |
|---|---|---|
| C1,C4,C6,C13 | 100pF | MQ300805C |
| C2 | 22pF | ATC600S |
| C3,C7 | 10uF | TDK1206 |
| C5 | 5.1pF | ATC600S |
| C8 | 8.2pF | ATC600S |
| C9,C10 | 10pF | ATC600S |
| C11 | 4.7pF | ATC600S |
| C12 | 12pF | ATC600S |
| R1 | 10Ω | MQ300603C |
| PCB | 20Mil Rogers4350 | |

## TYPICAL CHARACTERISTICS

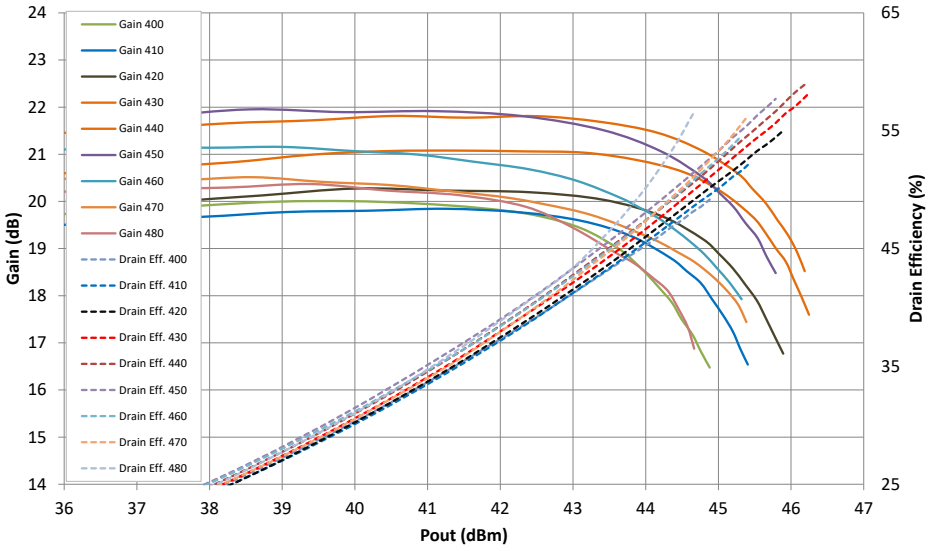



**Figure 3. Gain and Efficiency as function of CW Power Output**

# 900MHz

## Reference Circuit of Test Fixture Assembly Diagram

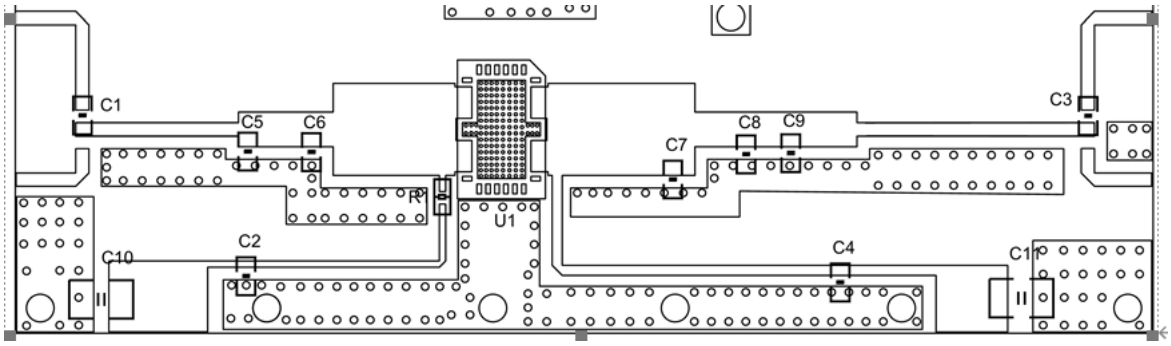
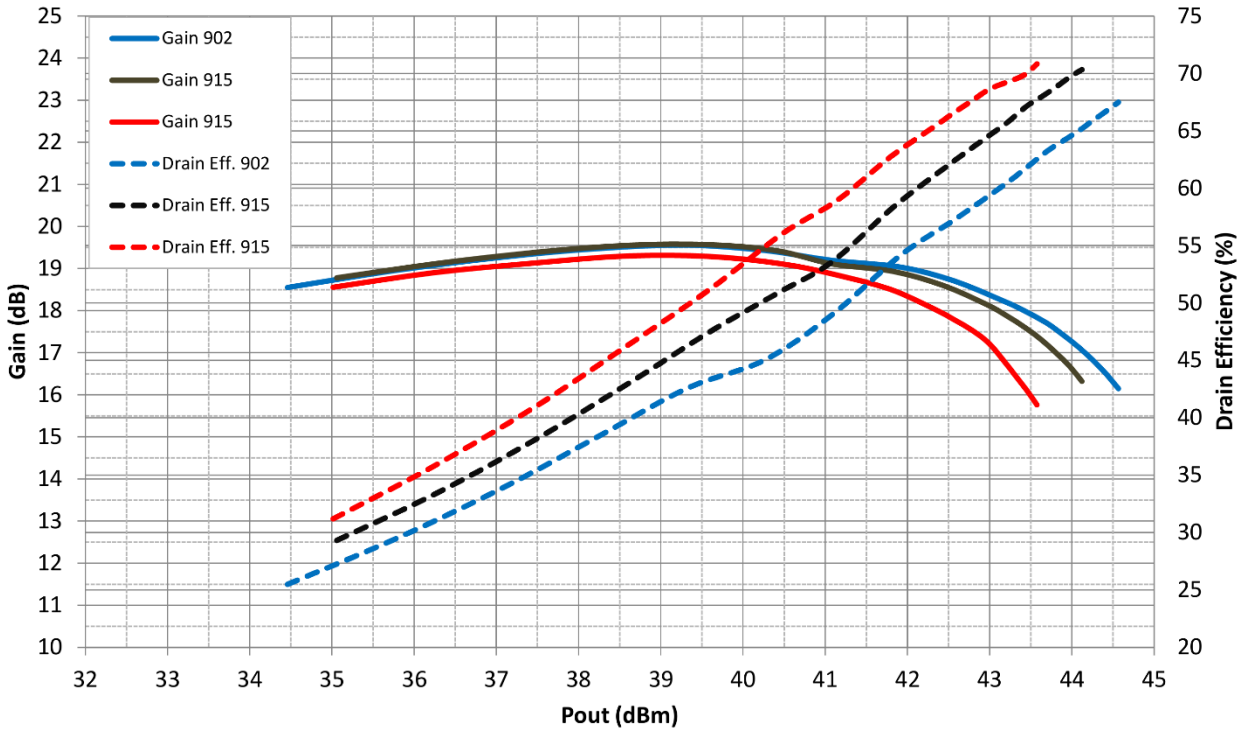



**Figure 5. Test Circuit Component Layout**

**Table 6. Test Circuit Component Designations and Values**

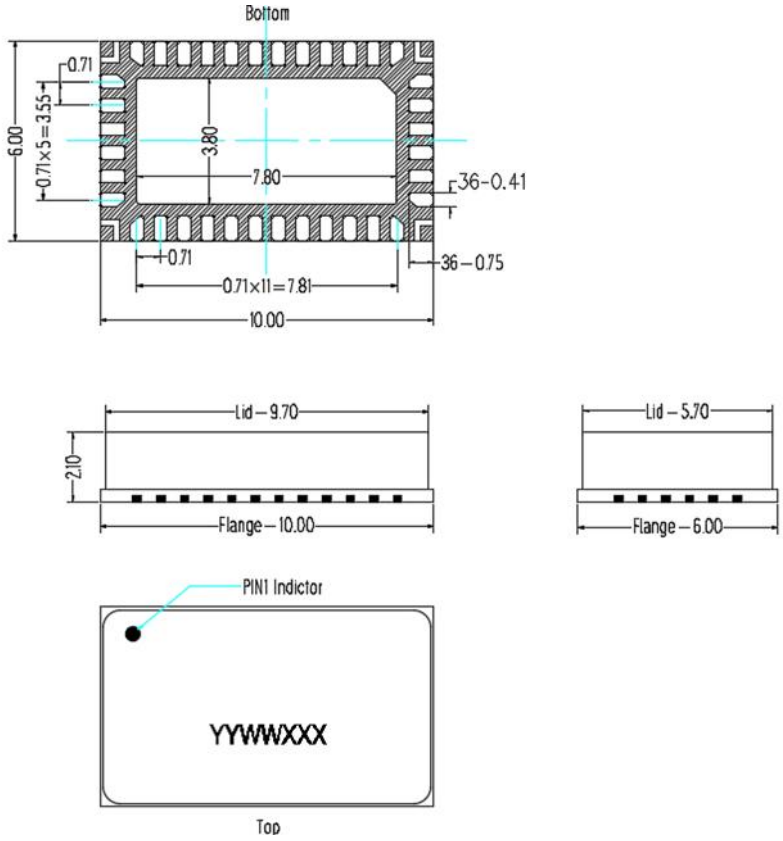
| Reference | Footprint | Value | Quantity |
|---|---|---|---|
| C2, C3, C4 | 0603 | 47pF/250V | 3 |
| C1, C5 | 0603 | 10pF/250V | 2 |
| C6, C7, C8 | 0603 | 5.6pF/250V | 3 |
| C9 | 0603 | 6.8pF/250V | 1 |
| C10, C11 | 1210 | 10uF/100V | 2 |
| R1 | 0603 | 10R | 1 |
| U1 | | ITEH09075C6 | 1 |

## Typical performance



## Package Dimensions

**10*6 Plastic Package**




Notes:

1. All dimensions are in mm;
2. The tolerances unless specified are ±0.2mm.

## Revision history

**Table 6. Document revision history**

| Date | Revision | Description |
|---|---|---|
| **2025/1/14** | **Rev 1.0** | as replacement of ITEH09070C6 |

**Application data based on HJ-24-20/ZBB-25-05**

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