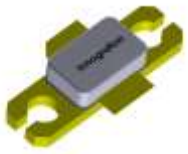
# MU1503V LDMOS TRANSISTOR

Document Number: MU1503V
Preliminary Datasheet V1.4

## 1500MHz, 30W, 50V High Power RF LDMOS FETs

**MU1503V**



### Description

The MU1503V is a 30-watt, highly rugged, unmatched LDMOS FET, designed for wide-band commercial and industrial applications at frequencies HF to 1.5 GHz.

•Typical Performance (On Innogration HF/VHF broad band fixture with device soldered):

| MU1503V VGS=-3.43V VDS=50V IDQ=140mA CW | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Freq (MHz)** | **Psat (dBm)** | **Psat (W)** | **IDS (A)** | **Pin (dBm)** | **Gain (dB)** | **Eff (%)** | **2nd （dBc）** | **3rd （dBc）** |
| **1.5** | 45.20 | 33.1 | 1.32 | 24.70 | 20.50 | 50.17 | -6.70 | -8.90 |
| **2** | 45.46 | 35.2 | 1.15 | 23.80 | 21.66 | 61.14 | -8.00 | -9.00 |
| **3** | 45.76 | 37.7 | 1.00 | 23.80 | 21.96 | 75.34 | -10.00 | -9.20 |
| **4** | 45.81 | 38.1 | 0.94 | 23.80 | 22.01 | 81.08 | -11.50 | -9.50 |
| **5** | 45.81 | 38.1 | 0.91 | 23.70 | 22.11 | 83.75 | -12.80 | -9.70 |
| **10** | 45.78 | 37.8 | 0.87 | 23.70 | 22.08 | 87.00 | -16.80 | -10.20 |
| **15** | 45.80 | 38.0 | 0.88 | 23.80 | 22.00 | 86.41 | -19.30 | -10.20 |
| **20** | 45.83 | 38.3 | 0.89 | 23.80 | 22.03 | 86.03 | -21.20 | -10.30 |
| **30** | 45.80 | 38.0 | 0.91 | 23.80 | 22.00 | 83.56 | -24.10 | -10.60 |
| **40** | 45.87 | 38.6 | 0.95 | 23.60 | 22.27 | 81.34 | -30.80 | -11.00 |
| **50** | 45.87 | 38.6 | 0.97 | 23.30 | 22.57 | 79.66 | -37.20 | -11.20 |
| **60** | 45.86 | 38.5 | 0.99 | 23.30 | 22.56 | 77.87 | -37.00 | -11.50 |
| **70** | 45.90 | 38.9 | 1.03 | 23.50 | 22.40 | 75.54 | -28.70 | -12.00 |
| **80** | 45.93 | 39.2 | 1.06 | 23.90 | 22.03 | 73.91 | -25.20 | -12.50 |
| **90** | 45.90 | 38.9 | 1.07 | 24.30 | 21.60 | 72.72 | -24.10 | -12.90 |
| **100** | 46.00 | 39.8 | 1.01 | 24.40 | 21.60 | 78.83 | -22.40 | -13.30 |
| **120** | 46.05 | 40.3 | 1.16 | 24.51 | 21.54 | 69.43 | -19.80 | -14.20 |
| **140** | 46.02 | 40.0 | 1.21 | 25.42 | 20.60 | 66.11 | -18.40 | -15.00 |
| **160** | 45.78 | 37.8 | 1.23 | 25.12 | 20.66 | 61.54 | -18.30 | -15.60 |
| **180** | 45.79 | 37.9 | 1.28 | 25.53 | 20.26 | 59.27 | -16.70 | -15.50 |
| **200** | 45.71 | 37.2 | 1.34 | 25.64 | 20.07 | 55.58 | -16.00 | -16.30 |
| **220** | 45.33 | 34.1 | 1.31 | 25.95 | 19.38 | 52.09 | -17.70 | -19.00 |
| **240** | 45.09 | 32.3 | 1.32 | 26.05 | 19.04 | 48.92 | -16.00 | -18.70 |
| **260** | 45.00 | 31.6 | 1.35 | 26.06 | 18.94 | 46.85 | -16.20 | -16.10 |
| **280** | 44.87 | 30.7 | 1.39 | 27.17 | 17.70 | 44.16 | -16.40 | -15.10 |
| **300** | 44.94 | 31.2 | 1.48 | 27.69 | 17.25 | 42.15 | -17.50 | -16.50 |

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## 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

- 2-30MHz (HF or Short wave communication)
- 30-88MHz (Ground communication)
- 54-88MHz (TV VHF I)
- 88-108MHz (FM)
- 118 -140MHz (Avionics)
- 136-174MHz (Commercial ground communication)
- 160-230MHz (TV VHF III)
- 30-512MHz (Jammer, Ground/Air communication)
- 470-860MHz (TV UHF)
- 100kHz - 1000MHz (ISM, instrumentation)

**Table 1. Maximum Ratings**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain--Source Voltage | $V_{DSS}$ | 120 | Vdc |
| Gate--Source Voltage | $V_{GS}$ | -10 to +10 | Vdc |
| Operating Voltage | $V_{DD}$ | +55 | 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 | $R_{\theta JC}$ | 0.95 | °C/W |

**Table 3. ESD Protection Characteristics**

| Test Methodology | Class |
|---|---|
| Human Body Model (per JESD22--A114) | Class 2 |

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **DC Characteristics** | | | | | |
| Drain-Source Voltage<br>$V_{GS}$=0, $I_{DS}$=1.0mA | $V_{(BR)DSS}$ | | 122 | | V |
| Zero Gate Voltage Drain Leakage Current<br>($V_{DS}$ = 50V, $V_{GS}$ = 0 V) | $I_{DSS}$ | —— | —— | 1 | μA |
| Gate--Source Leakage Current<br>($V_{GS}$ = 10 V, $V_{DS}$ = 0 V) | $I_{GSS}$ | —— | —— | 1 | μA |
| Gate Threshold Voltage<br>($V_{DS}$ = 50V, $I_D$ = 600 μA) | $V_{GS}(th)$ | —— | 2.73 | —— | V |
| Gate Quiescent Voltage | $V_{GS(Q)}$ | —— | 3.57 | —— | V |

| | | | | | |
|---|---|---|---|---|---|
| ($V_{DD}$ = 50 V, $I_D$ = 100 mA, Measured in Functional Test) | | | | | |
| Common Source Input Capacitance ($V_{GS}$ = 0V, $V_{DS}$ =50 V, f = 1 MHz) | $C_{ISS}$ | | 28.3 | | pF |
| Common Source Output Capacitance ($V_{GS}$ = 0V, $V_{DS}$ =50 V, f = 1 MHz) | $C_{OSS}$ | | 11.9 | | pF |
| Common Source Feedback Capacitance ($V_{GS}$ = 0V, $V_{DS}$ =50 V, f = 1 MHz) | $C_{RSS}$ | | 0.38 | | pF |

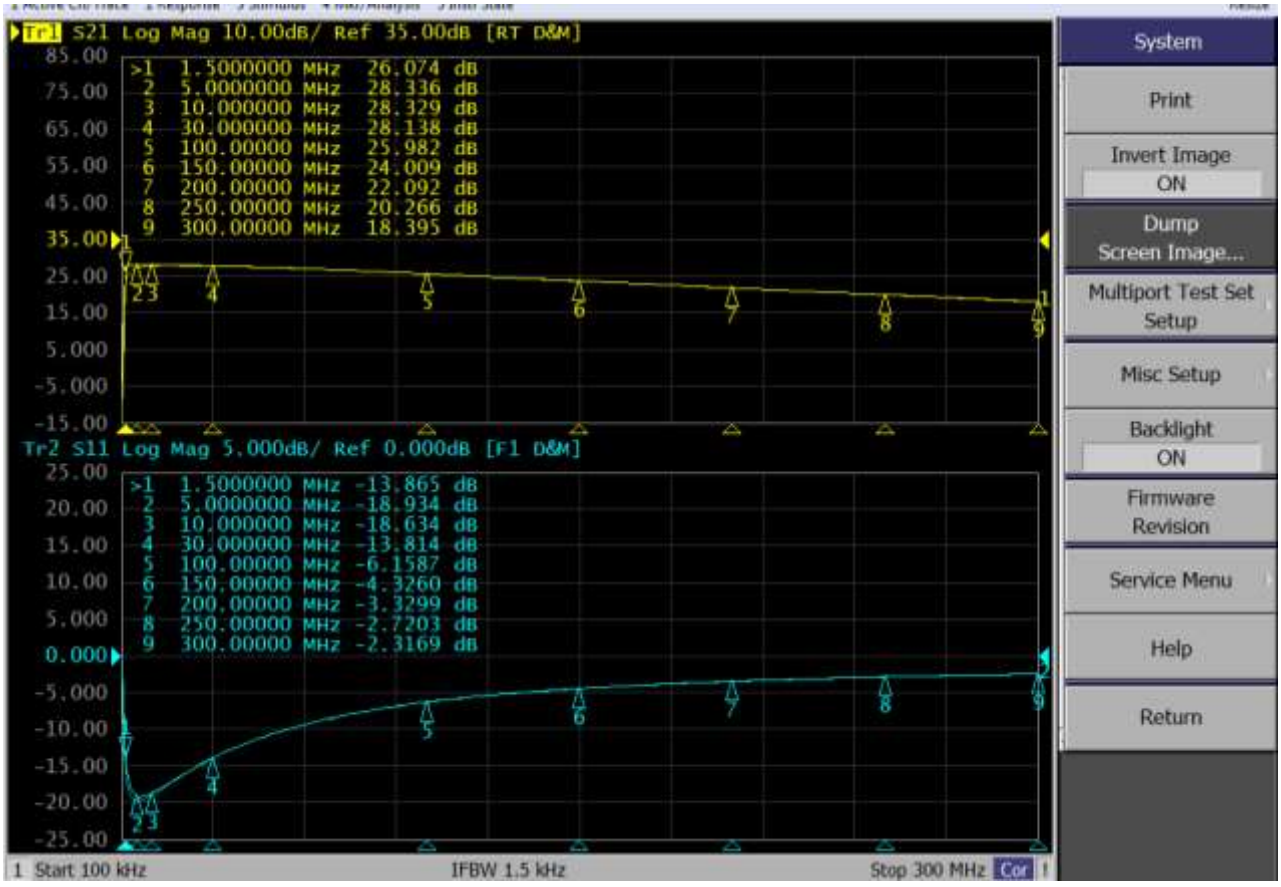
**Functional Tests** (In Demo Test Fixture, 50 ohm system) $V_{DD}$ = 50 Vdc, $I_{DQ}$ = 100mA, f = 915 MHz, CW Signal Measurements, Pin=21.5dBm

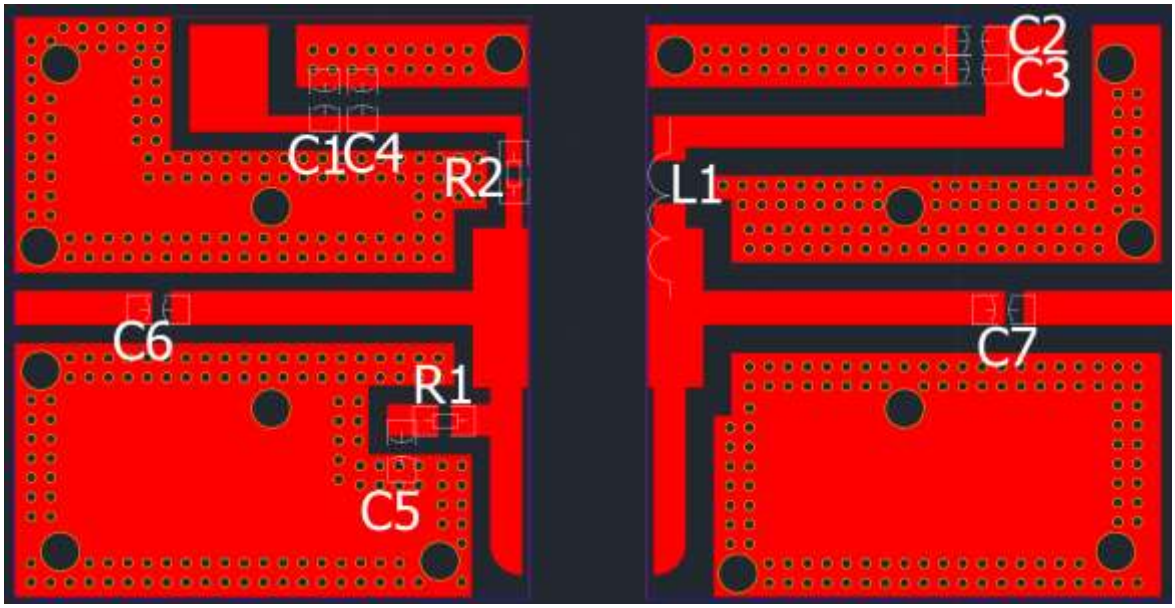
| | | | | | |
|---|---|---|---|---|---|
| Power Gain@Pout | Gp | —— | 24 | —— | dB |
| Output Power | Pout | 30 | 36 | | W |
| Drain Efficiency@Pout | $\eta_D$ | —— | 60 | —— | % |
| Input Return Loss | IRL | —— | -7 | —— | dB |

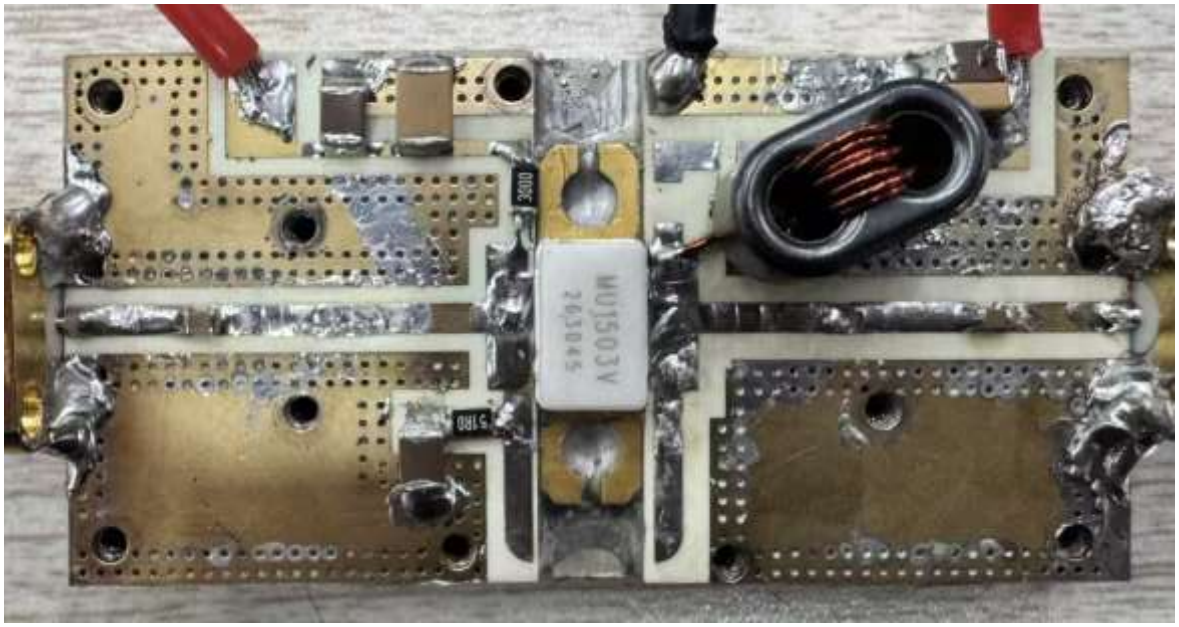
# 1.5-300MHz

## TYPICAL CHARACTERISTICS

**Figure 1: Network analyzer output S21/S11**



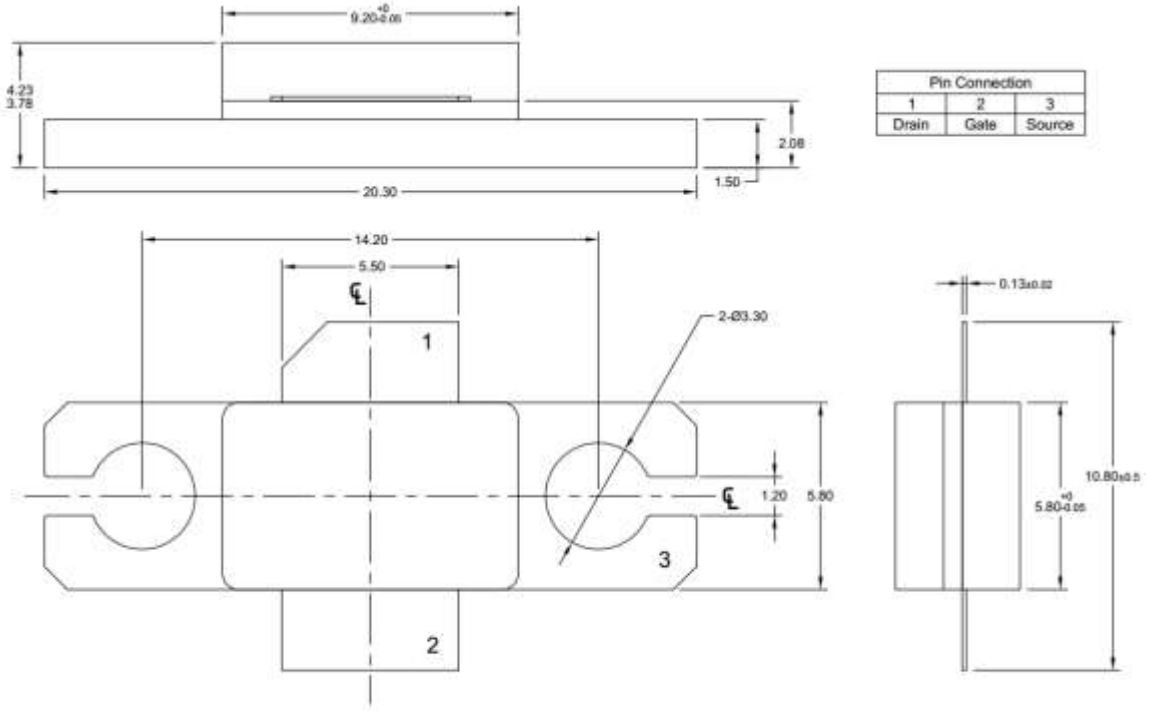



| Component | Description | Suggested Manufacturer |
|---|---|---|
| C1,C2,C5 | 10uF/200V-1210 | |
| C3,C4 | 10nF/200V-1210 | |
| C6,C7 | 10nF-0805-200V | |
| R1 | 10Ω/1206 | |
| R2 | 51Ω | |
| L1 | 0.8mm wire 10Turns； BN-43-502 | DIY |

## Package Outline

### Flanged ceramic package; 2 leads




| OUTLINE VERSION | REFERENCE | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | |
| PKG-GXB | | | | | 10/10/2017 |

**Figure 1. Package Outline PKG-G2E**

## Revision history

**Table 5. Document revision history**

| Date | Revision | Datasheet Status |
|---|---|---|
| 2017/7/18 | V1.0 | Preliminary Datasheet Creation |
| 2021/1/15 | V1.1 | Add 162.5MHz data |
| 2021/11/8 | V1.2 | Update package outline |
| 2024/10/29 | V1.3 | Add 81.36MHz application data on 1st page |
| 2026/10/26 | V1.4 | Add 1.5-300MHz simpler matching design as carrier application |

**Application data based on GZY-19-07/HL-24-47,TC-26-29**

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