Italian Technology Broadcast

AMD 1000 AR 144

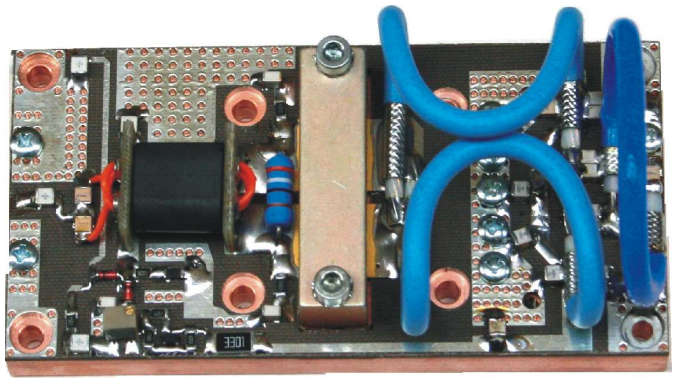
November 2011 – First Edition

HAM RADIO

1 KW SSPA 144 MHz RF POWER AMPLIFIER

SWR 65:1

- **RF Dispositive : MRF6VP61K25HR6 Freescale**
- **Frequency Range 142 - 146 MHz**
- **4 W Input ± 0.5 W (@ 1 KW Carrier Out)**
- **S.W.R. input (@ 144 MHz) ≤ 1.1:2**
- **S.W.R. Output ≤ 65:1**
- **Input - Output Impedance 50 Ω**
- **Mode: CW – FM – SSB " JT 65 " Mode**
- **Vdd 48 Volt (Max 50)**
- **Idd (@ 1KW Out RF) 29 A ± 5%**
- **Max Temperature Copper Base Plated 80℃**
- **Temperature Bias Compensated**
- **Adjustable Bias**
- **High efficiency (≥ 76 %)**
- **HIGH Quality**
- **High stability**
- **Teflon PC Board**
- **7.5 mm thickness Copper Base Plated**



Dimension : 100 X 50 X 40 mm

ABSOLUTE MAXIMUM RATINGS (Base Plate T = 65 °C)

Symbol	Parameter	Value	Unit
V_s	Drain Voltage Supply	50	**V dc**
I_s	Supply Current	30	**A dc**
VSWR	Load Mismatch (all phase angles, Tc=40°C, Id=30A)	≥ 20:1	
Tstg	Storage Temperature Range	-30 + 100	**°C**
Tc	Operating Temperature	10 + 90	**°C**

ELECTRICAL SPECIFICATIONS (Base Plate T. = 45 °C, 50Ω loaded, Vd = 48 V)

ELECTRICAL CHARACTERISTICS				
Characteristics	**MIN**	**Typ**	**Max**	**Unit**
Operating Frequency Range	142		146	MHz
Fundamental Output Power	1000		1100	W
Power Input		4	4.5	W
Power Gain (1000W output)		20	23	dB
I Drain	29	30	31	A
Collector Efficiency (Load 50Ω)	75	76	78	%
Input VSWR		1.3:1	1.6:1	
Insertion Phase Variation (Unit to Unit)		÷ 5		Degrees
Power Gain Variation (Unit to Unit)		÷ 1		dB
F2 Second Harmonic		- 45		dB
F3 Third Harmonic		- 35		dB

*** The above data is purely indicative, Italab may vary them without any warning**

* Recommend high ventilation

Contact Italab Communications +39 02 90389417 – Fax : 0039 02 23168389 or visit www.italab.it for a complete listing

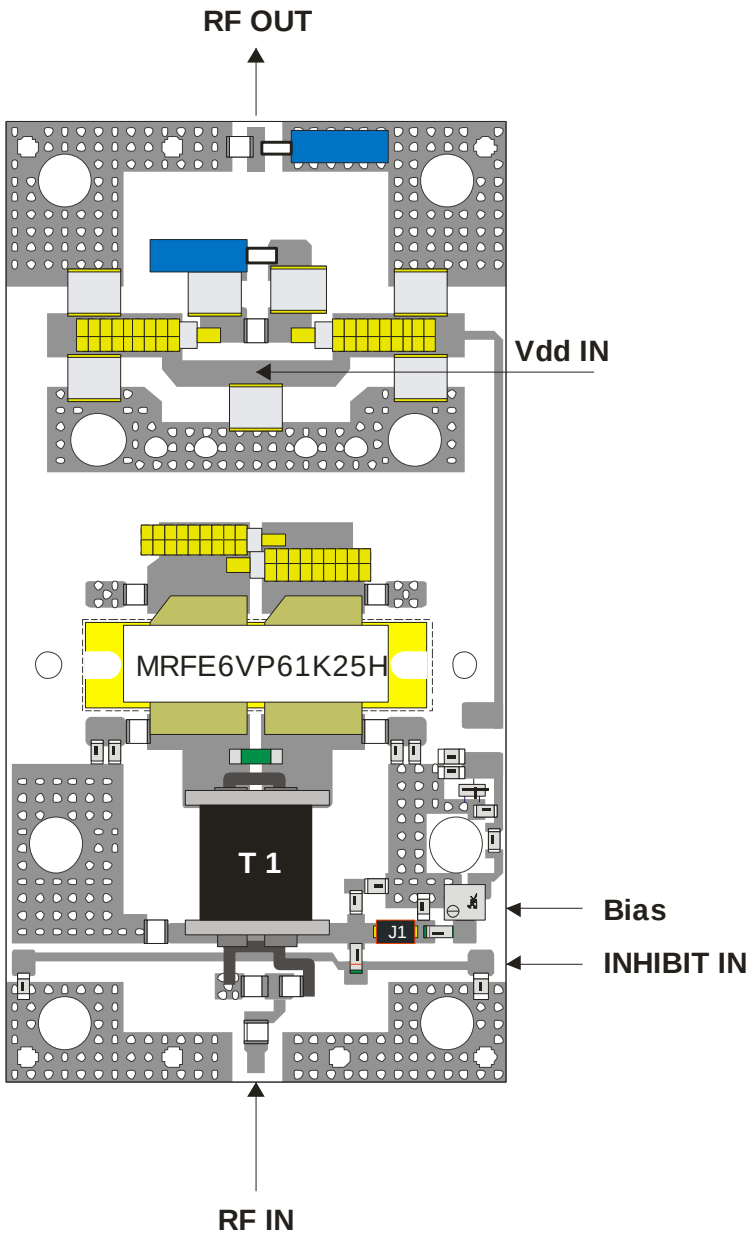
GENERAL DESCRIPTION

Our latest product in the HAM product category is the **AMD 1000 AR 144**. This module performs our variety of the Amateur radio equipments. It has exceptional characteristics and it is technically made up of “in the state of the art”.
AMD 1000 AR 144 allows an easy assembling in order to create a complete “ SSPA “(Solid State Power Amplifier).
The realization is very simple: a heatsink, two fans, a power supply, a simple protection, RF coaxial relays and RF connectors.
Having an high output power, it is highly recommended to use an adequate low pass filter (LPF).
Its high linearity makes it suitable for SSB usage and with an adequate ventilation, it will be also suitable for EME full power.

The module needs to be mounted on a heat sink able to dissipate about 500W (without exceeding of 50℃ temperature compared to the ambient one of 25℃).
The power supply must provide a well stabilized voltage of 48-50 V.
The relative current is 32 A min (Id) with no limitation.

This power module has very high gain. It is highly recommended to use a RF power attenuator in front of the input of the PA module, onto the heatsink.
This power divider serves two purposes. First it protects the amplifier against too high input power. Secondly it is not advised to reduce the power of a driver transceiver to some watts, because linearity usually decreases at low power levels. So better run at a medium power level (and good linearity) and then reduce the power level with a divider. Further, some transceivers produce short a full power spike even at low power settings, wihich will overdrive the module.
Suitable RF attenuators are available as an option.

CONNECTIONS

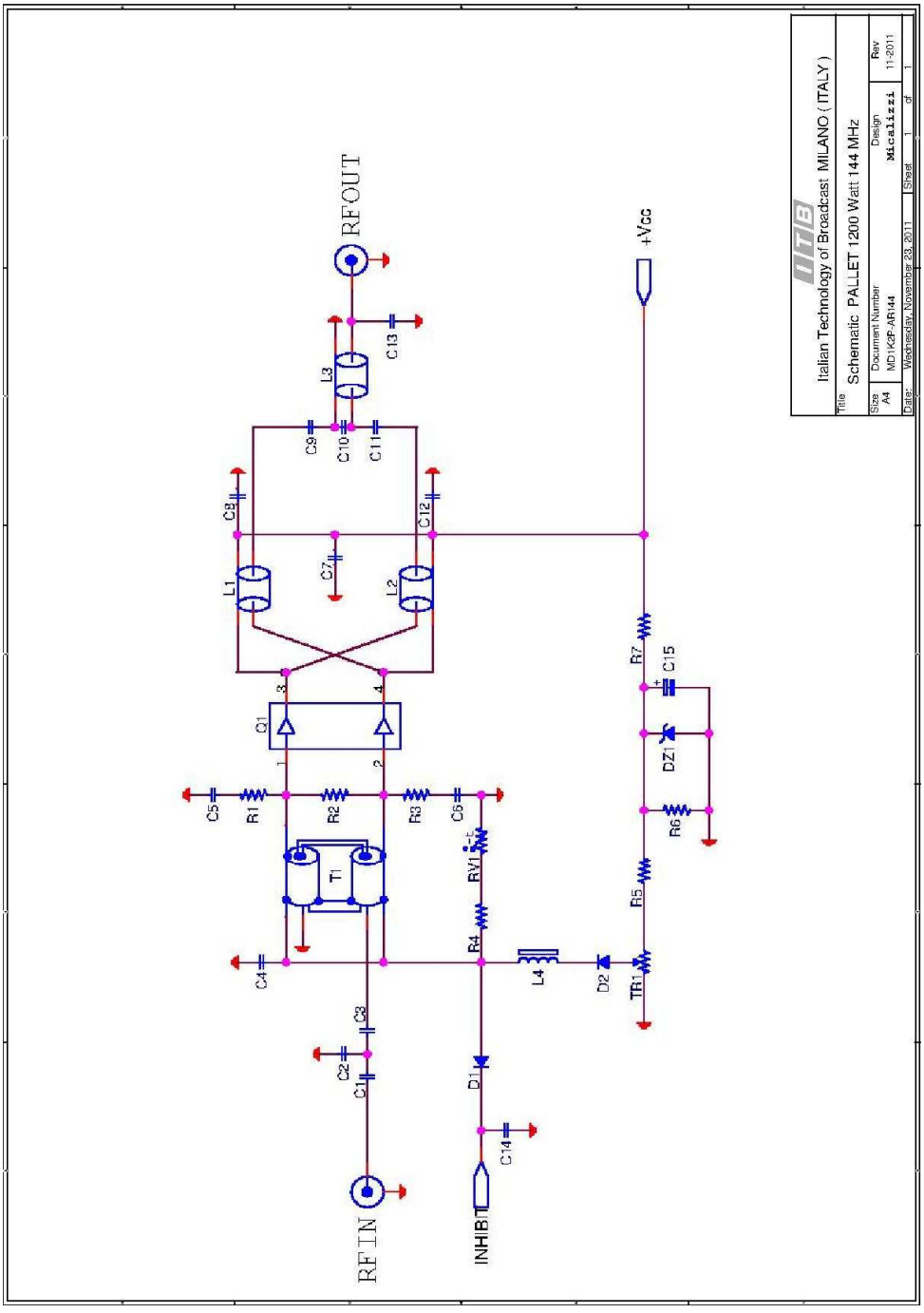


Vdd = + 50 Volt

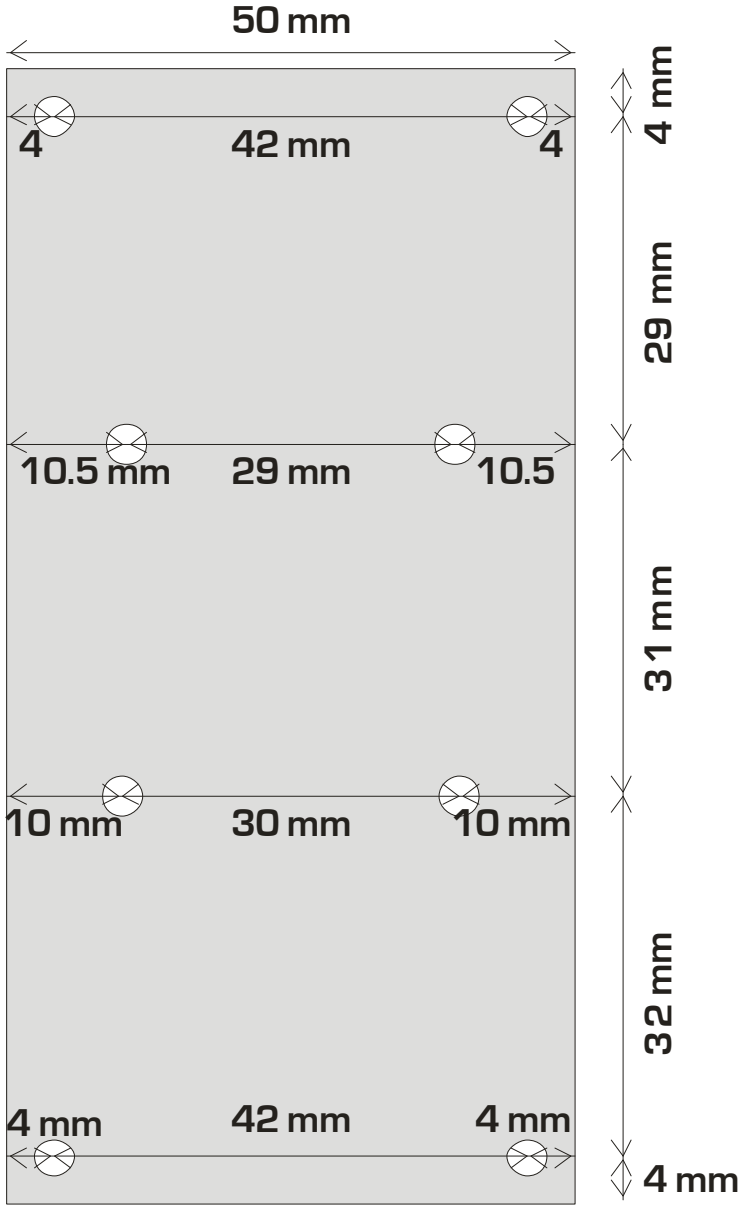
Inhibit = 0 - 5 Volt MAX (minus 5V!)

RF In = input 4.5 W max

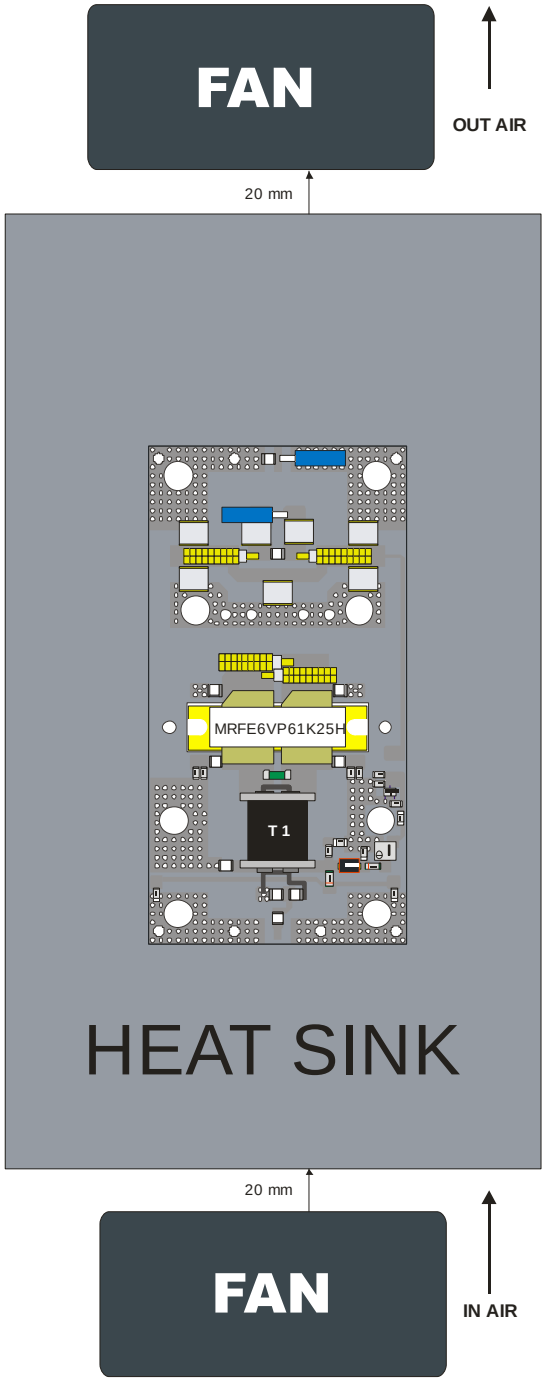
SCHEMATIC DIAGRAM



Heat Sink holes



VENTILATION SYSTEM



Assembling and testing

TEST SETUP

This amplifier has very high gain. We highly recommend to put a 6 – 10 dB, 100W attenuator in front of the module (see hint on p.1).

- Before fixing the **AMD 1000 AR 144** module with 8 screws of M3 x16 mm on a suitable heat sink (with power dissipation), add a **thin** layer of heat conduction paste **(p.5-6)** under the module
- Install the fans (type FFB0848EHE DELTA or equivalent) as per description (**p.5)**
- Connect the RF output to a 30dB (es. 8329 – 300 Bird 3 KW – 30 dB) power attenuator suitable for 1500W.
- Connect a Bolometer probe (3W full scale using an 30dB attenuator) to the power attenuator's output.
- Connect the transmitter's output to RF input **(p.3)**
- Set the voltage of the power suppy to 48-50 Volt.
- Set the current limit of the power supplier at 32A.
- Connect the positive power (+ Vdd) with a suitable electrical cable **(p.3),** connect ground to heatsink.

TURNING ON

- Set Transmitter to ZERO Watts output power. He said ZERO ! If your transmitter has a minimum output power of 5W or so, do not use it. At least not for the first test, even with a recommended input attenuator.
- Turn on Power supply and check idle current. S**hould be around 2 A for linear (SSB) operation.**
- Turn on fans (cooling system)
- Switch to transmit and carefully (he said carefully!) increase the output power of the transmitter until 100 - 200 W RF output of the module is reached.
- **We recommend to this operation to be done extremely careful because the gain of the PA is high.**
- If everything looks right, driving level may be increased until an output power not beyond 1000 W is reached (please see general characteristics of the datasheet).
- Please verify during this operation that both the Bolometer (for measuring the RF signal) and the Amperometer will indicate increase of output power. IF DC input increases but output not, RF output cables might **not well connected!**
- **Don't forget to monitor the heatsink temperature as well!**

INHIBIT

This input allows the regulation of the output power. This input is not suitable for reducing the output power in linear mode, as the operating class of the amplifier will be close to "C class" in this case.

The amplifier is shut off if a negative voltage of - 5 (minus five) Volts is applied to this input.
External protection circuitry may use this input to shut off the module due to excess temperature, excess output power, excess reflexted power or poor SWR. We strongly suggest to allow a max. reflected power of 200W. Following you must disable (TURN OFF) the Vdd**!**

TEMPERATURE CONTROL AND OTHER HINTS

We recommend to avoid temperatures of more than 80–90°C measured on the flange of the transistor**.** The temperature can be measured on the aluminium **bracket** which holds the transistor in place.

We also recommend to use only Teflon coaxial cables for the RF output and good quality RF connectors and relays.

We suggest to insert the **AMD 1000 AR 144** into an RF shielded box. Make sure your DC power supply is connected via cables suitable for a current of 30A.
Please do not forget to include a suitable Lowpass Filter (LPF) in the system. It is available as an option.