

AR211049

ART150FE, 64 MHz

v1.0 – March 15, 2021

AMPLEON

Application Report

Document information

Status v1.0

Abstract Measurement results of a demoboard design with the ART150FE at 64 MHz

1. Revision History

Table 1 – Report revisions

Revision	Date	Description	Author
1.0	2021.03.15	Initial document	

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5. General description

This report presents the measurement results of the demoboard designed for 64 MHz using the ART150FE transistor based on 65V ART technology. During assembly, the PCB has been screwed down without soldering it and the connection of the transistor has been made with a pressing block. Thermally conductive paste has been put under the transistor to improve the thermal behavior.

The dedicated demo-circuit is matched to 50 Ω at input and output.

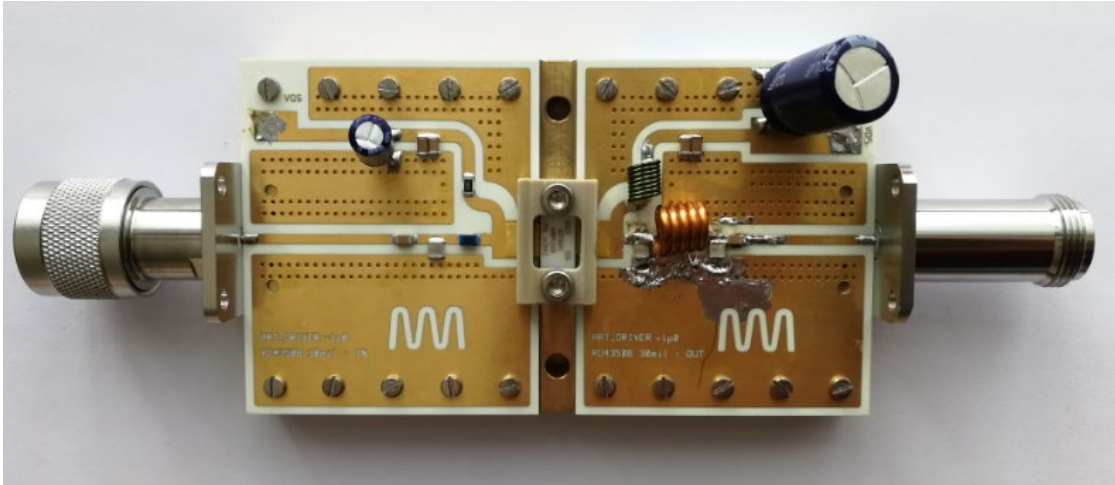


Figure 1 – Demo front view

Table 2 – Test circuit information

Parameter	Description	Unit
Laminate Type	Rogers 4350B	
Dk	3.48	
Df	0.0037 @10 GHz	
Laminate thickness	0.762	mm
Copper thickness	1 oz top/bottom	
Overall dimensions	106 x 60	mm
Cooling type	Indirect water cooling	
Device Package	SOT467	

6. CW RF characteristics

Table 3 – Performance indication

Test signal: CW; RF performance at $V_{DS}=65V$; $I_{Dq}=10mA$; $T_{cooling\ water}=25^{\circ}C$

Symbol	Parameter	Conditions	Typical	Unit
f	Frequency		64	MHz
V_{DS}	Drain-source voltage		65	V
V_{GS}	Gate-source voltage	$I_{Dq} = 10mA$	1.7	V
Gp	Power Gain	$P_{1dBcp}=147.9\ W$	32.1	dB
η_D	Drain Efficiency	$P_{1dBcp}=147.9\ W$	78.8	%

7. CW Performance Details

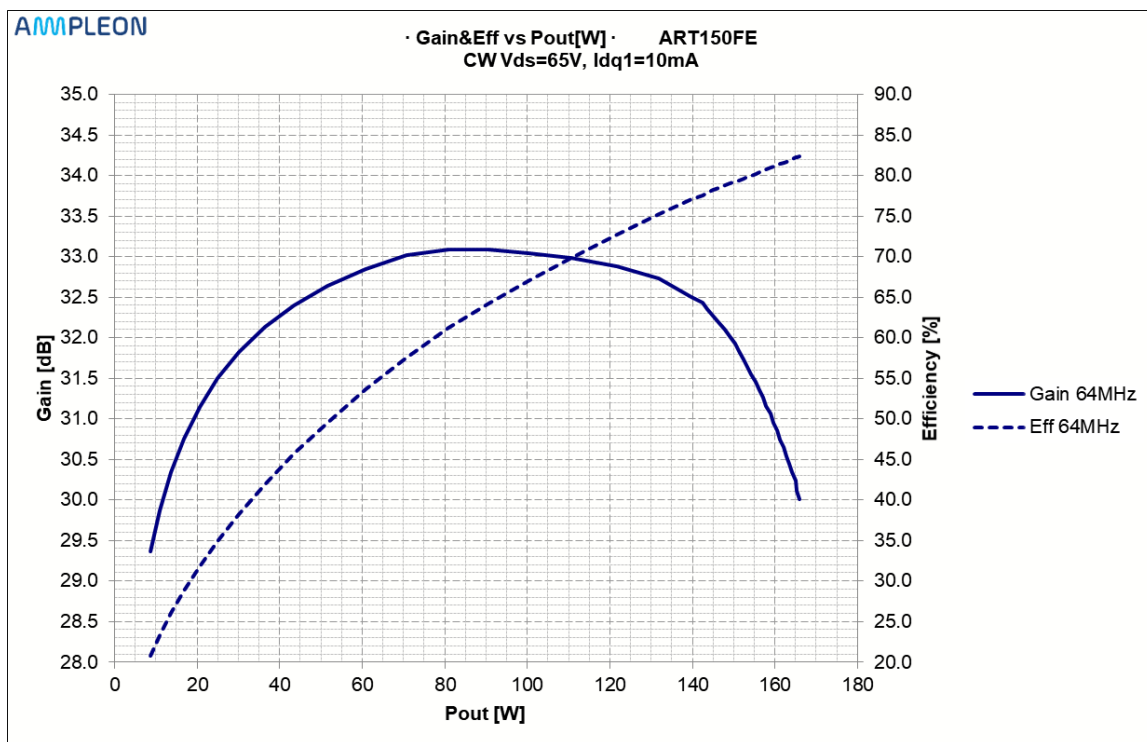


Figure 2 – CW performance

Table 4 – RF Performance overview

Freq [MHz]	Gmax [dB]	Pout@Gmax [W]	P1dB [W]	P2dB [W]	P3dB [W]	Effmax [%]	Pout@Effmax [W]	Eff P1dB [%]	Eff P2dB [%]	Eff P3dB [%]
64	33.09	90.63	147.94	158.58	165.43	82.42	165.90	78.78	80.87	82.32

8. Harmonic Rejection

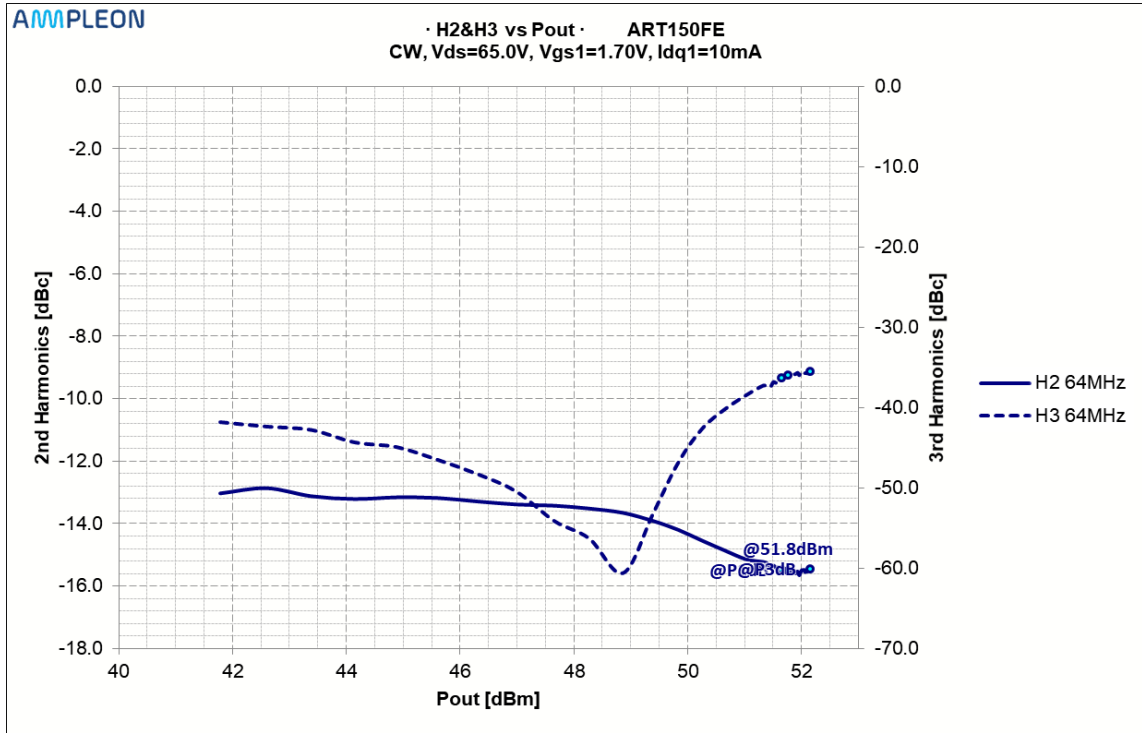


Figure 3 – Harmonics level measured during the output power sweep

9. Thermal Picture

The board has been measured with an IR camera to detect hotspots. The hottest component is the output series inductor but the temperature is still at an acceptable level.

The following conditions have been applied:

- VDS=65V, Idq=10 mA
- Water temperature: 25 degC
- Signal Type: CW
- Output Power: 160W

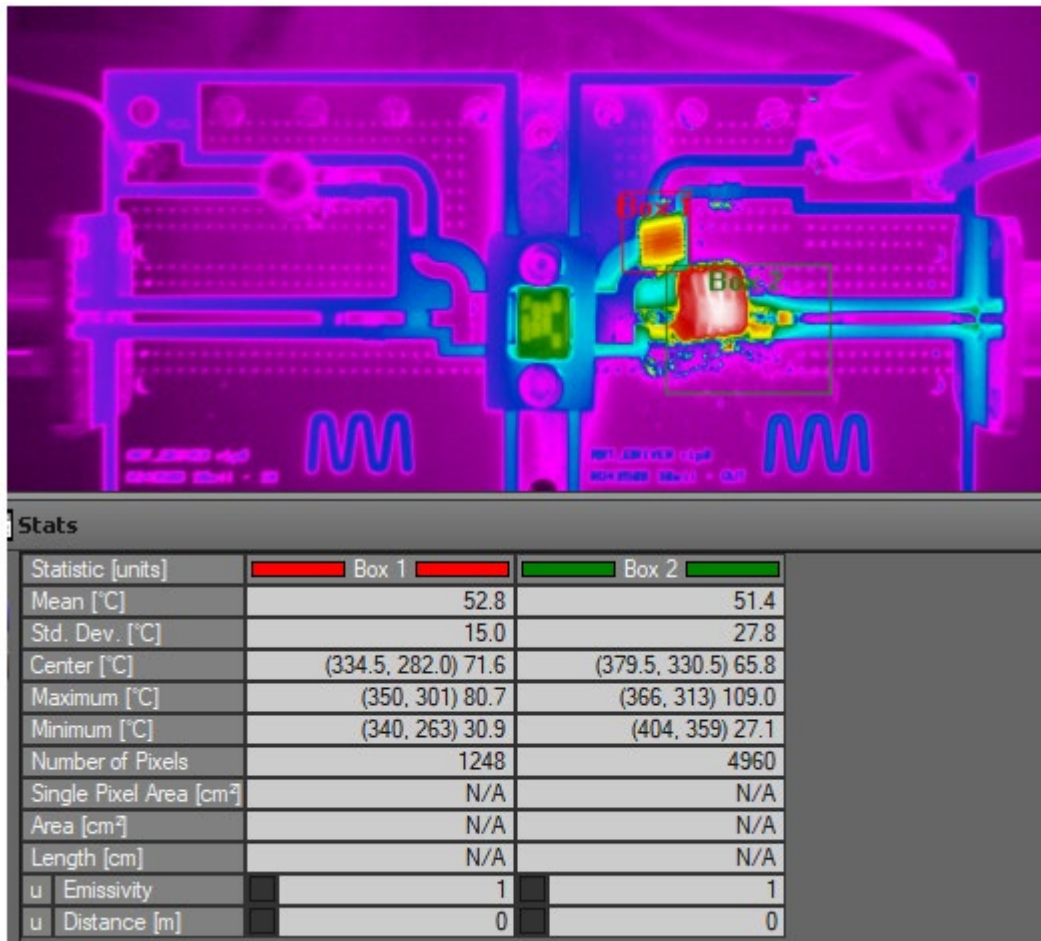


Figure 4 – IR CW Thermal picture

10. User Guide

10.1 Biasing

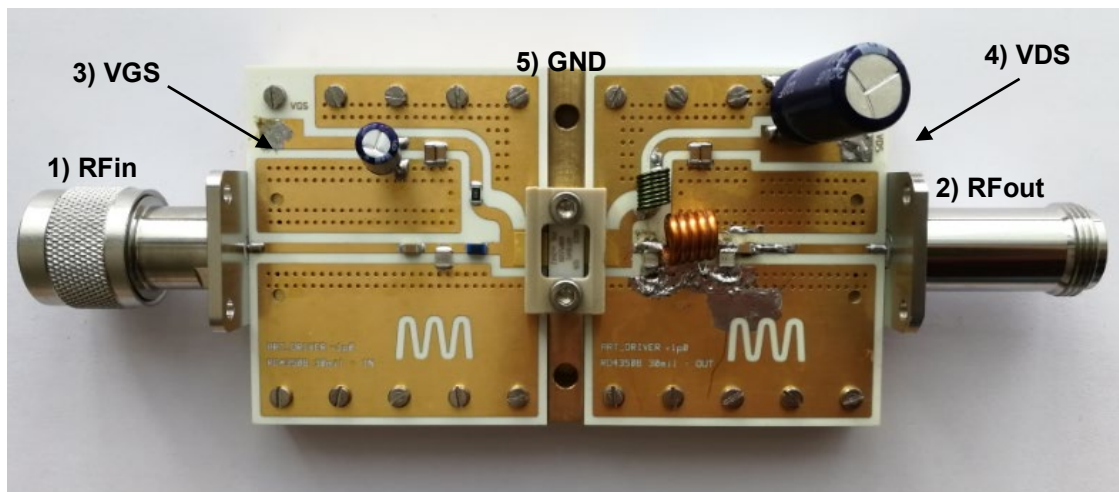


Figure 5 – Board pin configuration

Table 5 – Pin description

Symbol	Pin	Description
RF _{IN}	1	RF input
RF _{OUT}	2	RF output
V _{GS}	3	Gate-source voltage
V _{DS}	4	Drain-source voltage
GND	5	Negative supply terminal for V _{DS} and V _{GS}

10.2 Bill of Materials

Table 6 – Bill of Materials

Part	Description	Value	Remark
C1, C5, C6, C12	Multilayer ceramic chip capacitor	100 nF	100V
C2	Multilayer ceramic chip capacitor	100 pF	ATC800B
C3	Electrolytic capacitor	47uF	
C4, C7	Multilayer ceramic chip capacitor	4.7uF	100V
C8	Electrolytic capacitor	220 uF	100V
C9	Multilayer ceramic chip capacitor	39 pF	ATC800B
C10	Multilayer ceramic chip capacitor	56 pF	ATC800B
C11	Multilayer ceramic chip capacitor	100 pF	ATC800B
R1	Chip Resistor	5.1 kOhm	1206
L1	Chip inductor	120 nH	1206CS
L2	Air core inductor	130 nH	2222SQ
L3	Air core inductor	5 turns, D=5.3 mm, Length=7.5 mm, WireD=1.5 mm	68 nH*

*Remark: if more power is required from the demo the inductance can be lowered by choosing a smaller coil diameter

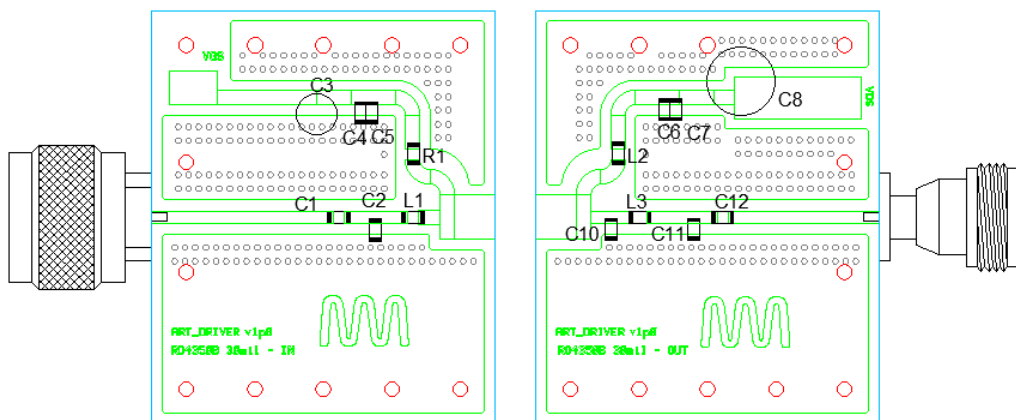


Figure 6 – Component mapping

10.3 Device markings

Table 7 – Module specifics

Parameter	Value
Manufacturer	Ampleon
Device	ART150FE
Comments	Engineering sample: m2042 – 0023 – 26

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