AR201093

ART2K0, 60 to 85 MHz

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AMPLEON

Application Report

Document information	
Status	v1.0
Abstract	Measurement results of a concept module based on ART2K0 optimized for 60 to 85 MHz pulsed and CW applications.

1. Revision History

Table 1 – Report revisions

Revision	Date	Description	Author
1.0	2020.05.18	Initial document	

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5. General description

This report presents the measurement results of the concept module designed for various frequencies from 60 to 85 MHz using ART2K0, Advanced Rugged Technology (ART) LDMOS power transistor.

The transistor version in overmolded plastic package (ART2K0PE) with straight leads has been used to enable the automated assembly process. It is expected that the modules based on ART2K0FE and ART2K0PEG would have comparable performance.

The module was tuned for two subbands to get maximum performance around 60, 64 MHz (tuning A) and 81,36 MHz (tuning B). Only values of SMD components have been changed.

The measurements presented in this report were done with the pulsed signal. The measurement results with the CW signal will be added in the next revision.

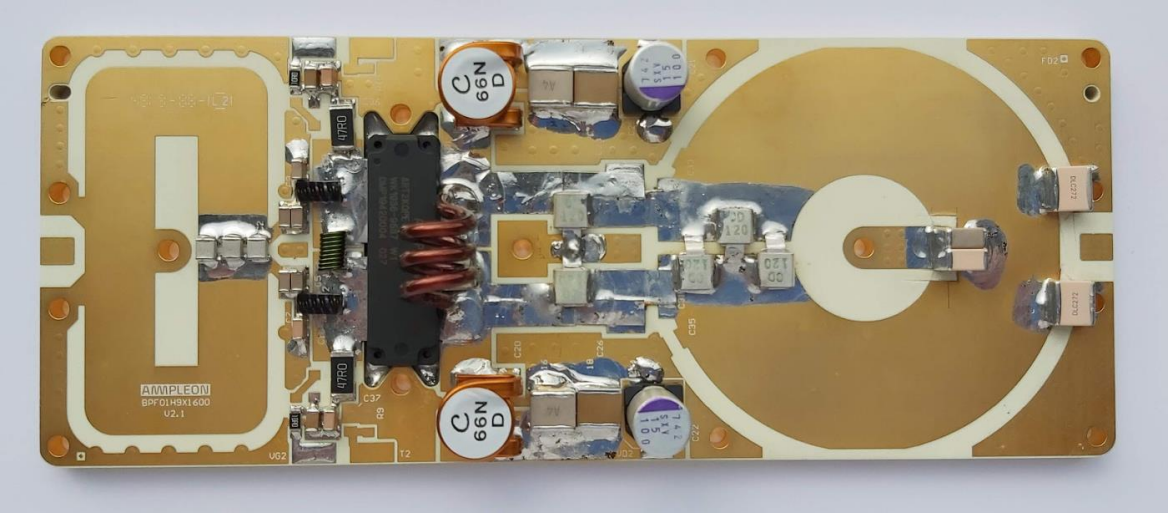

Figure 1 – View of the concept module

Table 2 – Mechanical characteristics

Parameter	Description	Unit
L x W	152 x 60	mm
Total height	18	mm

For more information related to module design, bill of materials, integration, please contact Ampleon marketing/sales representative.

6. RF characteristics (tuning A)

Table 3 – RF characteristics at V_{DS}=50V (tuning A)

Test signal: CW pulsed, 100us pulse width, 10% duty cycle; total I_{Dq}=100mA; $T_{cooling\ water}$ =25°C

Freq (MHz)	Gmax (dB)	P1dB (W)	P3dB (W)	P6dB (W)	Effmax (pct)	Eff_P1dB (pct)	Eff_P3dB (pct)	Eff_P6dB (pct)
60	27.4	874.3	1040	1132	88.4	81.3	86.5	88.4
64	27.8	911.3	1068	1171	87.4	81.8	85.7	87.3
70	27.7	949.3	1113	1173	84.7	80.2	84.5	84.3

Table 4 – RF characteristics at V_{DS}=55V (tuning A)

Test signal: CW pulsed, 100us pulse width, 10% duty cycle; total I_{Dq}=100mA; $T_{cooling\ water}$ =25°C

Freq (MHz)	Gmax (dB)	P1dB (W)	P3dB (W)	P6dB (W)	Effmax (pct)	Eff_P1dB (pct)	Eff_P3dB (pct)	Eff_P6dB (pct)
60	27.7	1049	1248	1363	88.1	80.7	85.8	88.1
64	28.2	1104	1290	1415	87.0	81.6	85.4	87.0
70	28.1	1145	1343	1419	84.6	79.9	84.4	84.2

Table 5 – RF characteristics at V_{DS}=60V (tuning A)

Test signal: CW pulsed, 100us pulse width, 10% duty cycle; total I_{Dq}=100mA; $T_{cooling\ water}$ =25°C

Freq (MHz)	Gmax (dB)	P1dB (W)	P3dB (W)	P6dB (W)	Effmax (pct)	Eff_P1dB (pct)	Eff_P3dB (pct)	Eff_P6dB (pct)
60	28.09	1237	1477	1591	85.9	79.5	84.8	85.4
64	28.6	1312	1531	1680	86.5	80.5	84.5	86.3
70	28.5	1352	1593	1685	83.7	78.8	83.3	83.4

Table 6 – RF characteristics at V_{DS}=65V (tuning A)

Test signal: CW pulsed, 100us pulse width, 10% duty cycle; total I_{Dq}=100mA; $T_{cooling\ water}$ =25°C

Freq (MHz)	Gmax (dB)	P1dB (W)	P3dB (W)	P6dB (W)	Effmax (pct)	Eff_P1dB (pct)	Eff_P3dB (pct)	Eff_P6dB (pct)
60	28.1	1418	1691	1774	83.4	78.7	83.3	81.1
64	28.7	1524	1788	1955	86.1	80.7	84.7	86.1
70	28.7	1561	1862	1970	84.0	78.8	83.7	83.8

7. Thermal performance (tuning A)

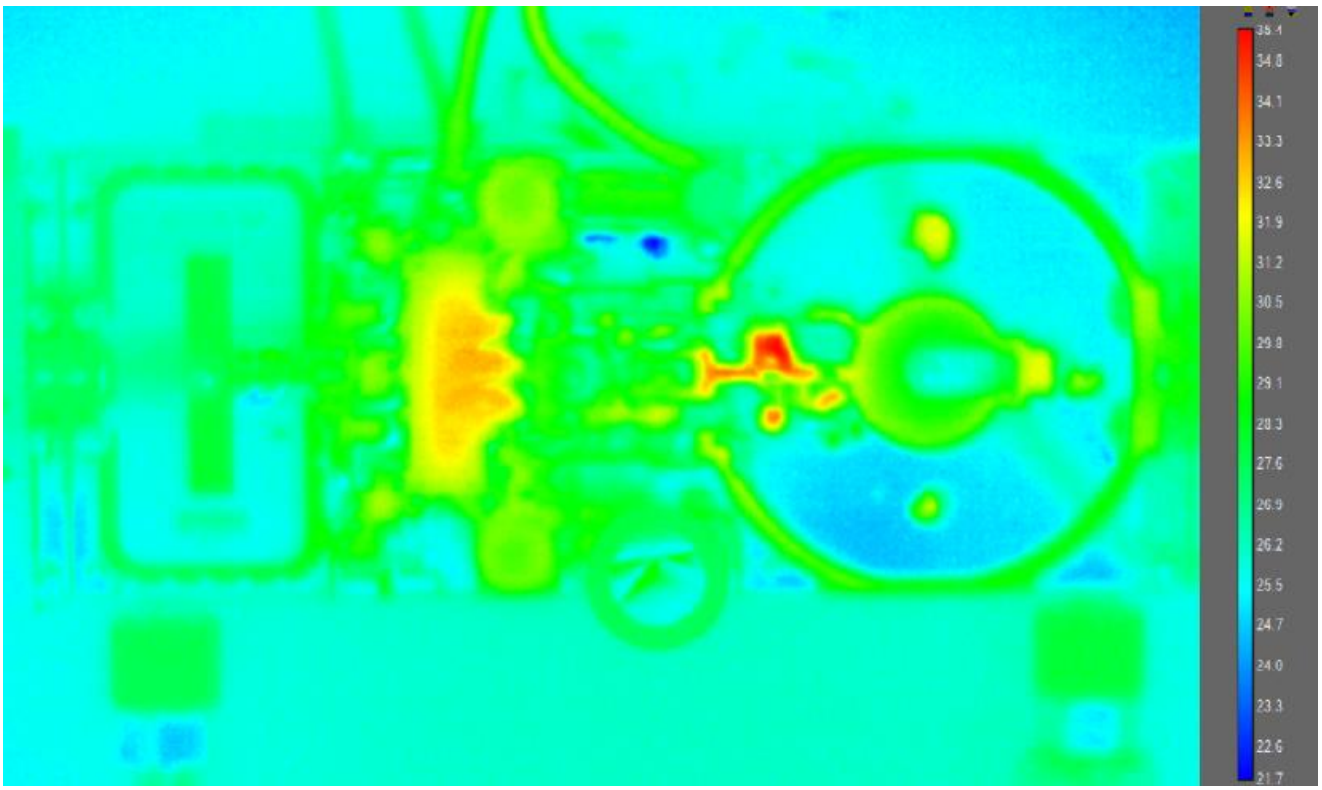

Figure 2 – IR image of the module (tuning A)

Test signal: F = 64 MHz, Pout = 1950 W, CW pulsed, 100us pulse width, 10% duty cycle; total I_{Dq}=100mA; $T_{cooling\ water}$ =25°C

The top surface of the balun and matching capacitors have a 5°C temperature rise.

8. RF characteristics (tuning B)

Table 7 – RF characteristics at V_{DS}=55V (tuning B)

Test signal: CW pulsed, 100us pulse width, 10% duty cycle; total I_{Dq}=100mA; $T_{cooling\ water}$ =25°C

Freq (MHz)	Gmax (dB)	P1dB (W)	P3dB (W)	P5dB (W)	Effmax (pct)	Eff_P1dB (pct)	Eff_P3dB (pct)	Eff_P5dB (pct)
75	23.2	1249	1442	1489	82.1	77.6	81.9	82.0
80	23.4	1305	1512	1561	84.4	78.6	83.6	84.4
85	23.9	1085	1324	1434	81.3	72.2	78.9	81.1

Table 8 – RF characteristics at V_{DS}=60V (tuning B)

Test signal: CW pulsed, 100us pulse width, 10% duty cycle; total I_{Dq}=100mA; $T_{cooling\ water}$ =25°C

Freq (MHz)	Gmax (dB)	P1dB (W)	P3dB (W)	P5dB (W)	Effmax (pct)	Eff_P1dB (pct)	Eff_P3dB (pct)	Eff_P5dB (pct)
75	23.3	1452	1705	1734	81.7	76.9	81.7	80.2
80	23.5	1526	1789	1834	83.7	78.1	83.5	83.6
85	23.8	1289	1579	1693	81.1	72.1	79.0	81.0

9. Thermal performance (tuning B)

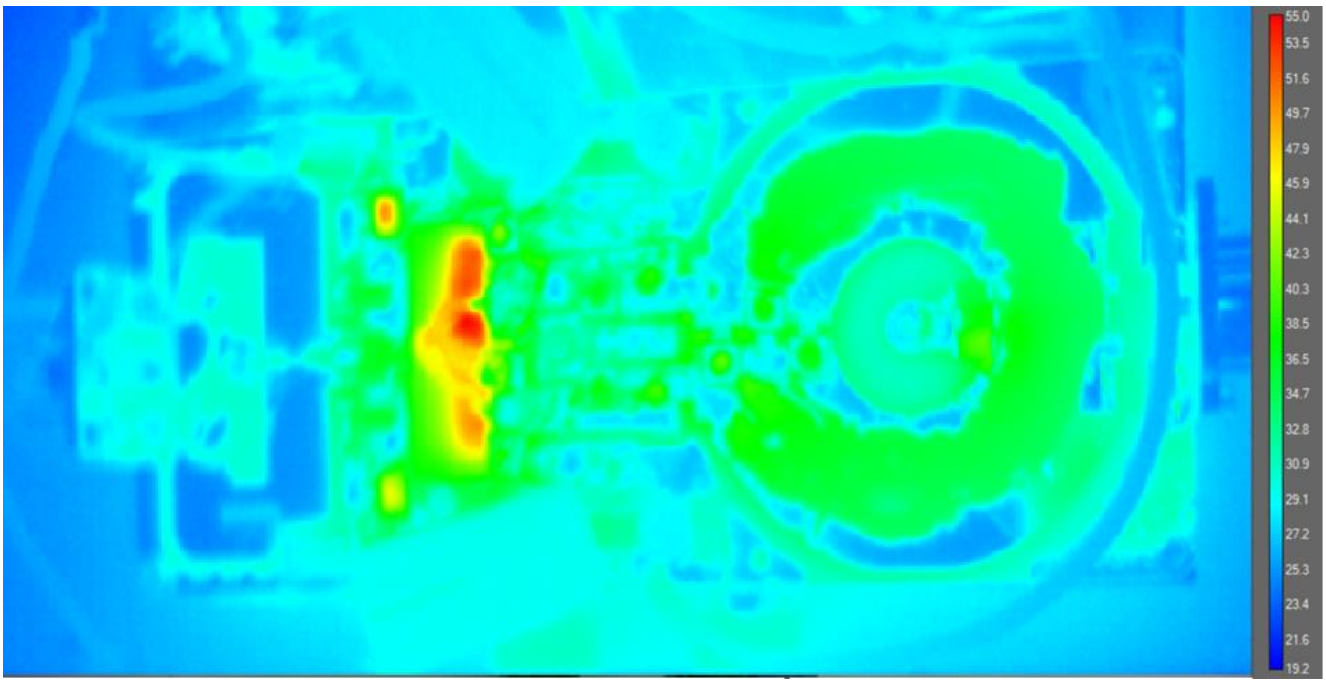

Figure 3 – IR image of the module (tuning B)

Test signal: F = 80 MHz, Pout = 1800 W, CW pulsed, 100us pulse width, 20% duty cycle; total I_{Dq}=100mA; $T_{cooling\ water}$ =25°C

The top surface of the balun and matching capacitors have a 7°C temperature rise. The expected temperature rise, when operating with 1800W CW, is 35°C.

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