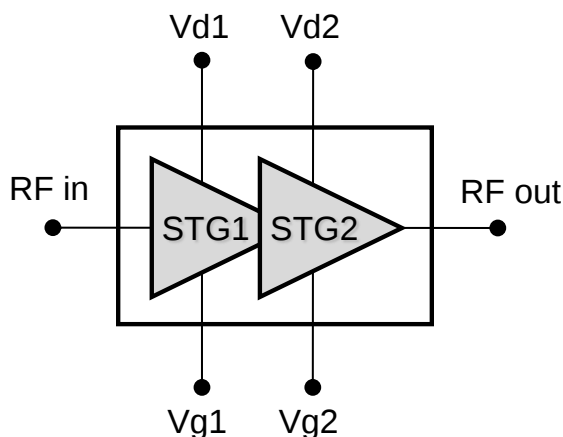


Advanced Information: AI2413

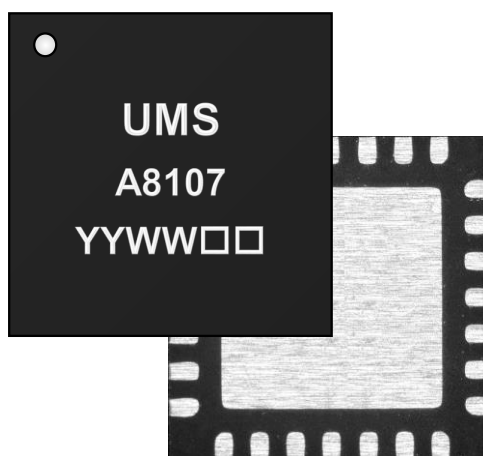
4.5 – 6.8 GHz High Power Amplifier

GaN Monolithic Microwave IC



The CHA8107-QCB is a two-stage GaN High Power Amplifier for the 4.5 – 6.8GHz frequency band. This HPA operates with a drain voltage from 14V to 24V. Depending on the applied voltage, this HPA provides between 8W and 20W of saturated output power associated with 58% Power Added Efficiency on average across the frequency band.

Designed for Radar application, it is also ideal for a wide range of microwave systems. The product is developed on a robust GaN-on-SiC HEMT process and is available in a QFN plastic package.



Electrical Characteristics

Test conditions : $T_{case} = 25^{\circ}\text{C}$, $V_d = 18\text{V}$, $I_{dq} = 315\text{mA}$

Symbol	Parameter	Min	Typ	Max	Unit
Freq	Frequency range	4.5		6.8	GHz
Gain	Linear Gain		28		dB
Pout	Saturated output Power		41		dBm
PAE	Power Added Efficiency		62		%
Id	Drain current at saturation		1.4		A
S11	Input Return Loss		15		dB
S22	Output Return Loss		15		dB

These values are representative of on board measurements as defined on the drawing in paragraph "Evaluation Board".

Absolute Maximum Ratings ⁽¹⁾

Symbol	Parameter	Values	Unit
Vd	Drain bias voltage	27	V
Vg	Gate bias voltage	-7 to -1.5	V
Id	Drain current	1.8	A
Pin	Maximum peak input power overdrive	22	dBm

⁽¹⁾ Operation of this device above any of these parameters may cause permanent damage.

Recommended Operating Range ^{(2), (3)}

Symbol	Parameter	Values	Unit
Vd	Drain bias voltage range	14 – 24	V
Idq	Drain quiescent current	190 – 315	mA
$T_{junction}$	Maximum junction temperature	200	$^{\circ}\text{C}$
T_{case}	Operating temperature range	-40 to 85	$^{\circ}\text{C}$
T_{stg}	Storage temperature range	-55 to 150	$^{\circ}\text{C}$

⁽²⁾ Electrical performances are defined for specified test conditions

⁽³⁾ Electrical performances are not guaranteed over all recommended operating conditions

Advanced Information

Device Thermal Performances

All the figures given in this section are obtained assuming that the die is only cooled down by conduction through the package case.

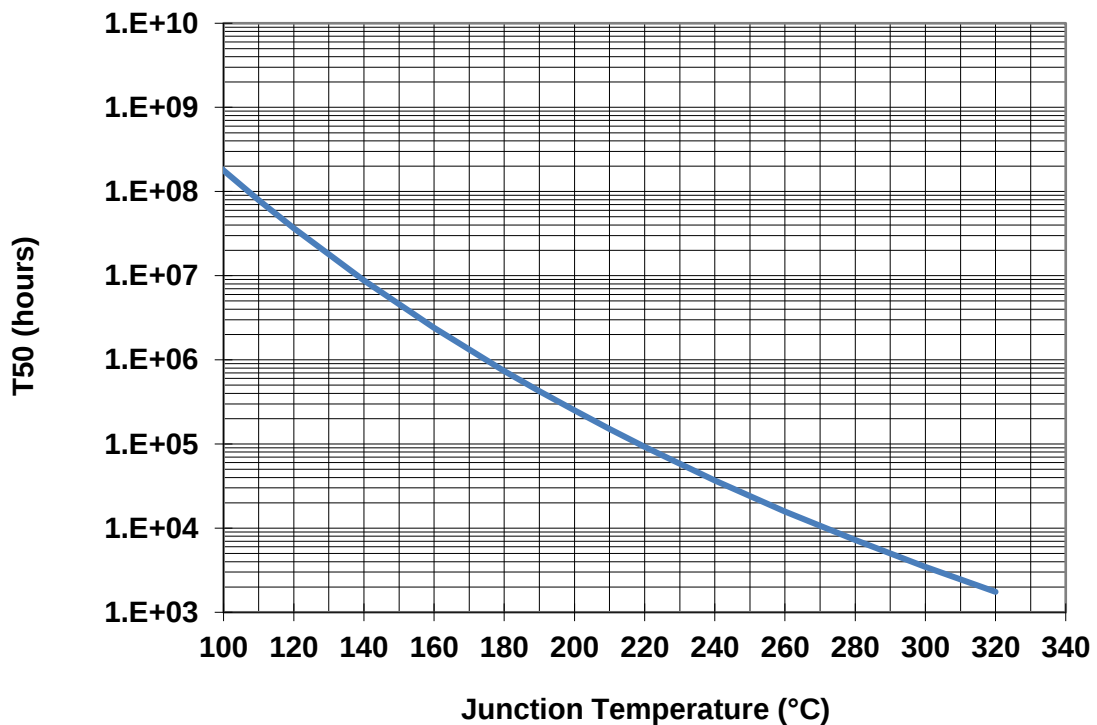
The temperature is monitored at the QFN backside interface (T_{case}).

For nominal operation, the system's maximum temperature must be adjusted to ensure that the junction temperature ($T_{junction}$) remains below the maximum value specified in the Recommended Operating Ratings table.

The system PCB must be designed to comply with this requirement.

Parameter	Conditions	$T_{junction}$ (°C)	R_{TH} (°C/W)	T_{50} (hours)
$R_{TH}^{(1)}$ Thermal Resistance (Junction to Case)	$P_{diss} = 5.1W$	111	4.90	7E+07
	$P_{diss} = 7.0W$	119	4.80	3E+07
	$P_{diss} = 8.9W$	127	4.76	2E+07
	$P_{diss} = 10.7W$	137	4.80	1E+07
	$P_{diss} = 12.5W$	140	4.37	1E+07
	$P_{diss} = 14.3W$	147	4.35	6E+06
	$P_{diss} = 16.10W$	155	4.33	3E+06

⁽¹⁾ Assuming 85°C T_{case} .



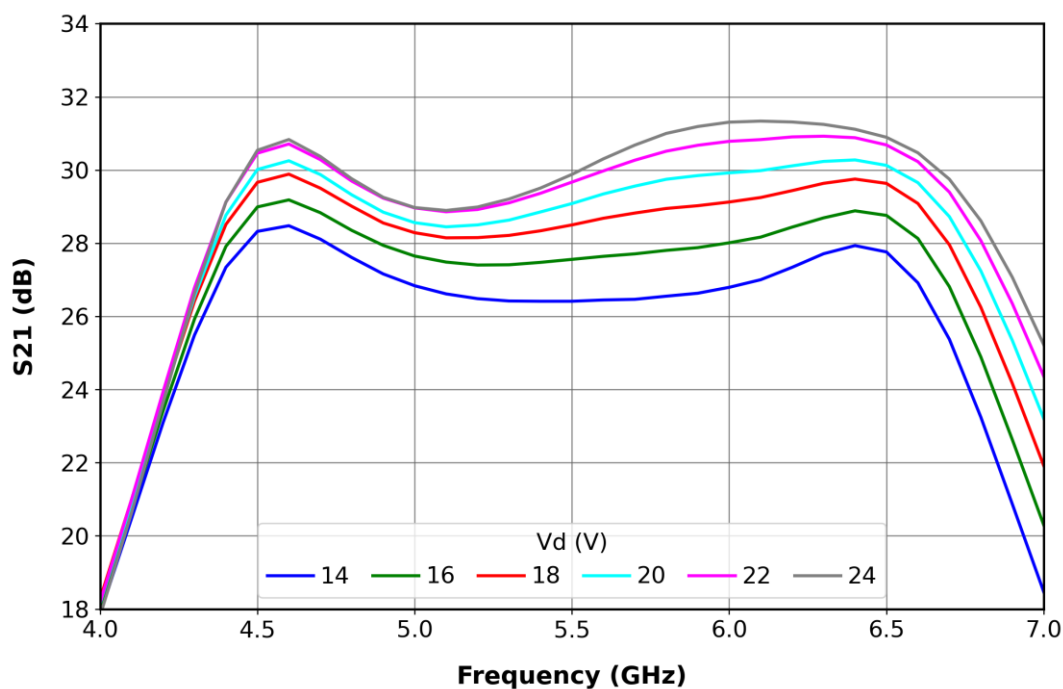
Advanced Information

Typical Board Measurements

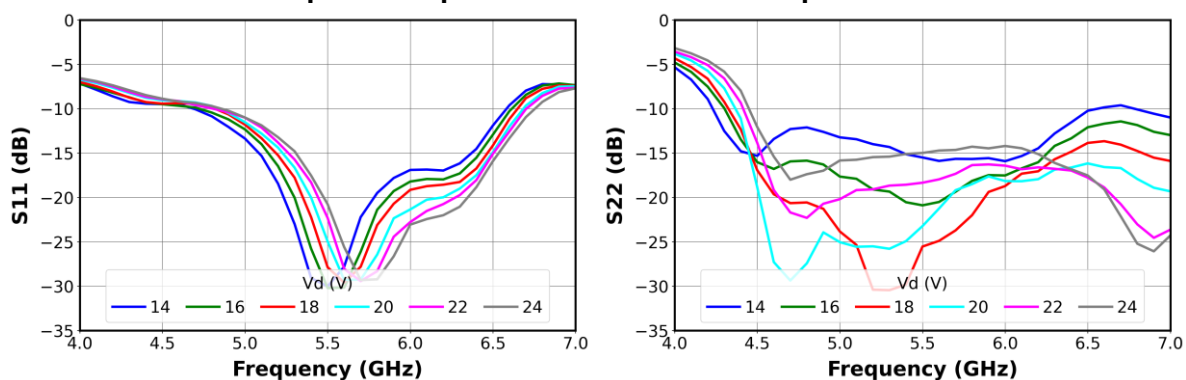
Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, $T_{case} = 25^{\circ}C$, $I_{dq} = 315mA$

Linear gain vs. Freq and Vd



Input & Output Return losses vs. Freq and Vd



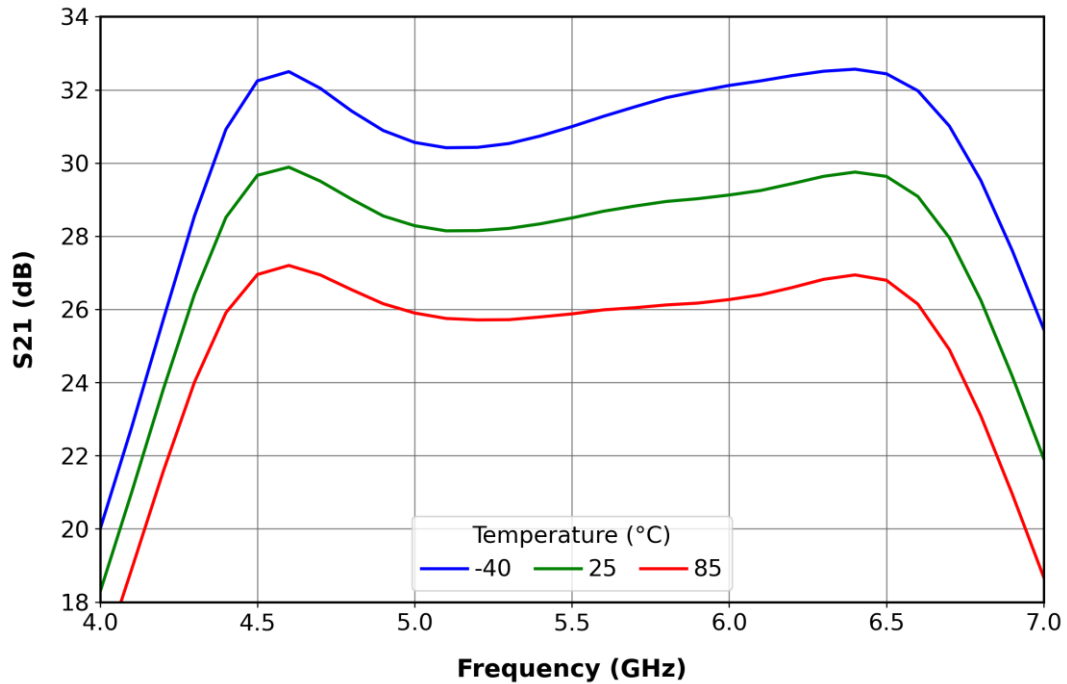
Advanced Information

Typical Board Measurements

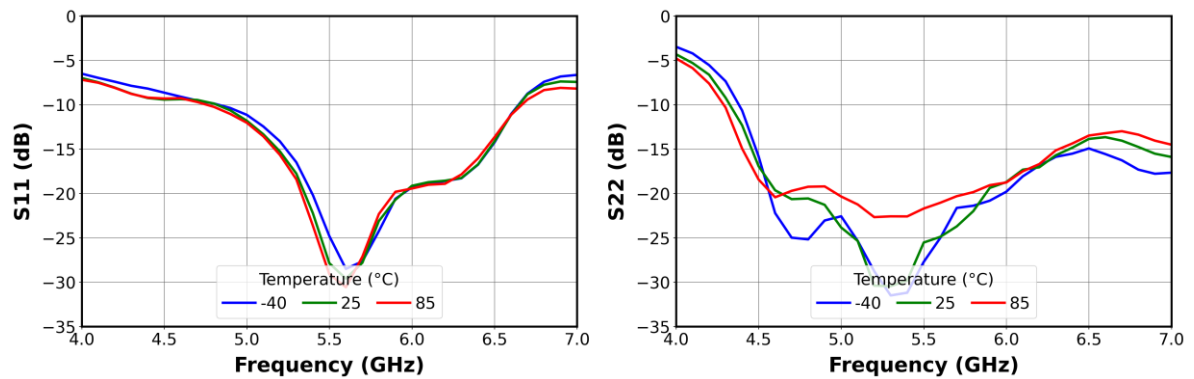
Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : $V_d = 18V$, $I_{dq} = 315mA$

Linear gain vs. Freq and Temperature



Input & Output Return losses vs. Freq and Temperature

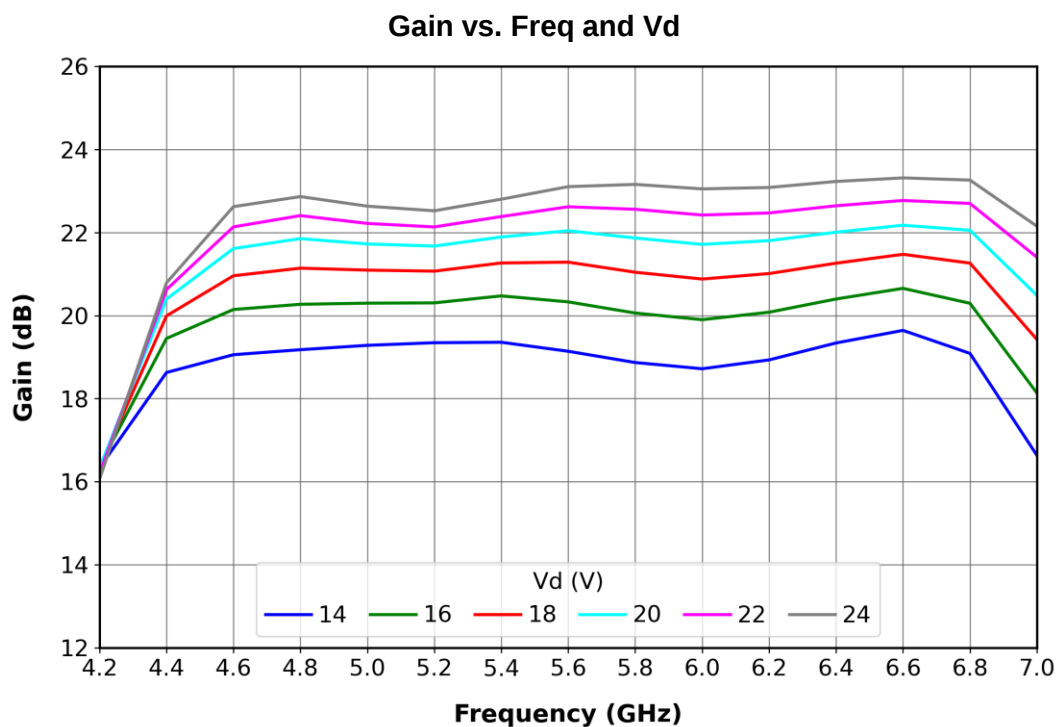
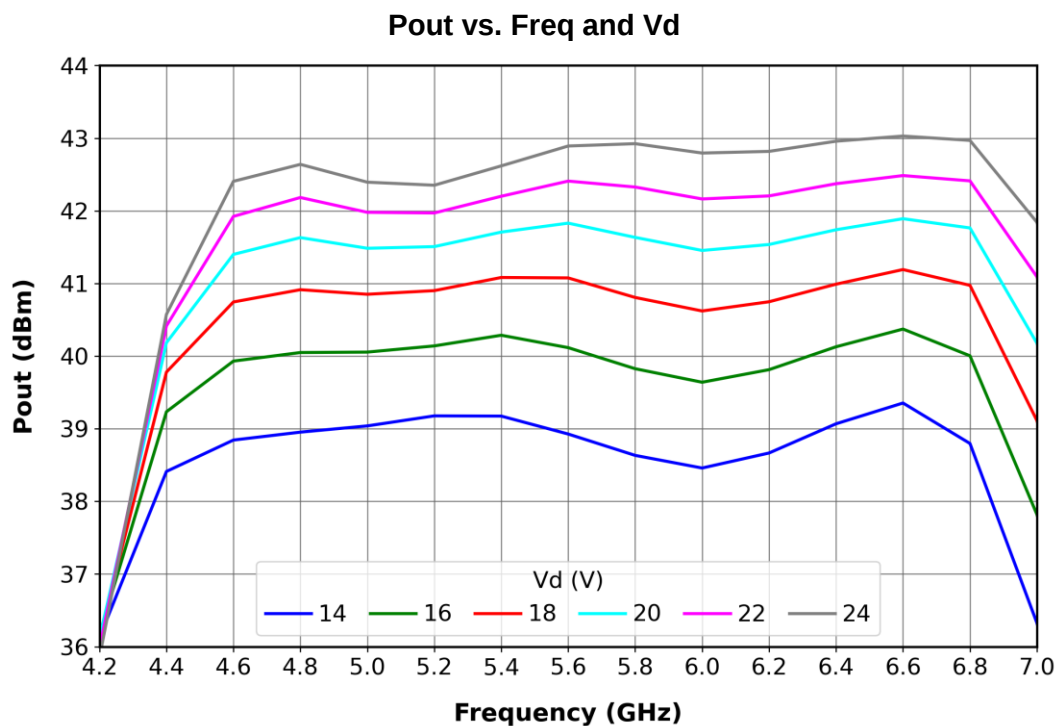


Advanced Information

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes

Test conditions : CW, $T_{case} = 25^{\circ}C$, $I_{dq} = 315mA$, $P_{in} = 19dBm$

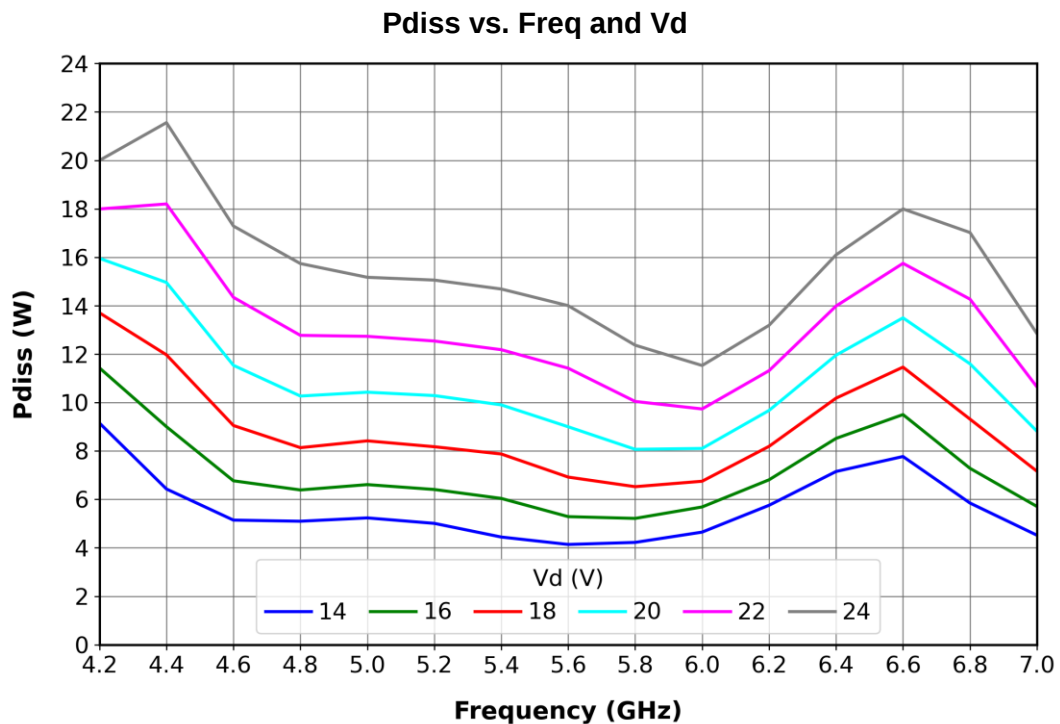
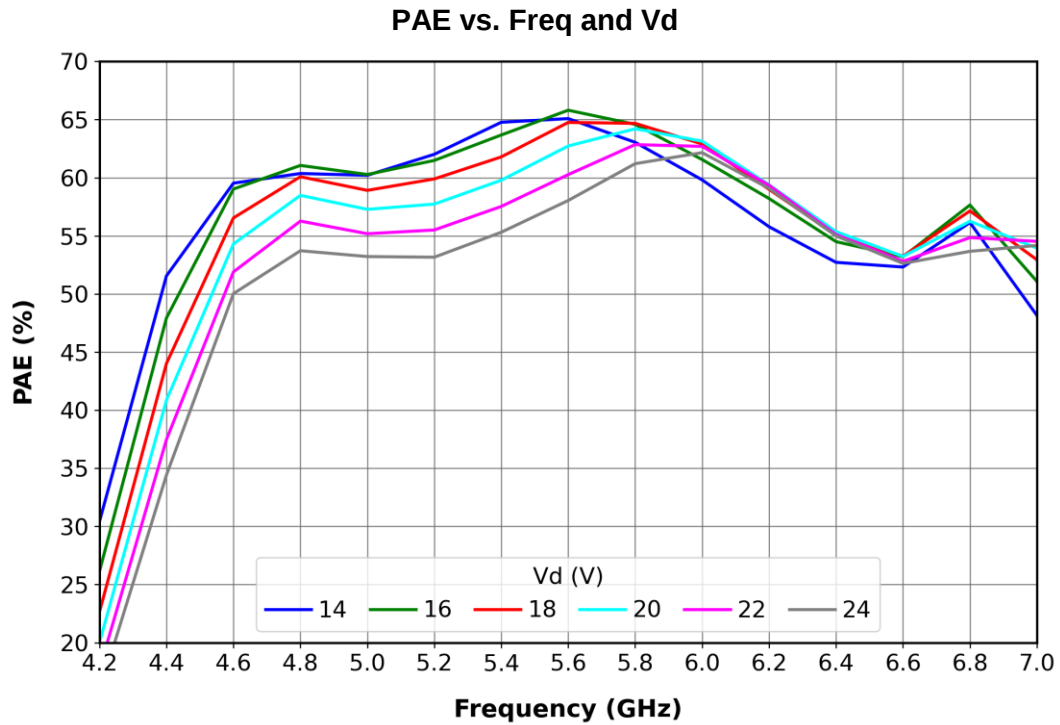


Advanced Information

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes

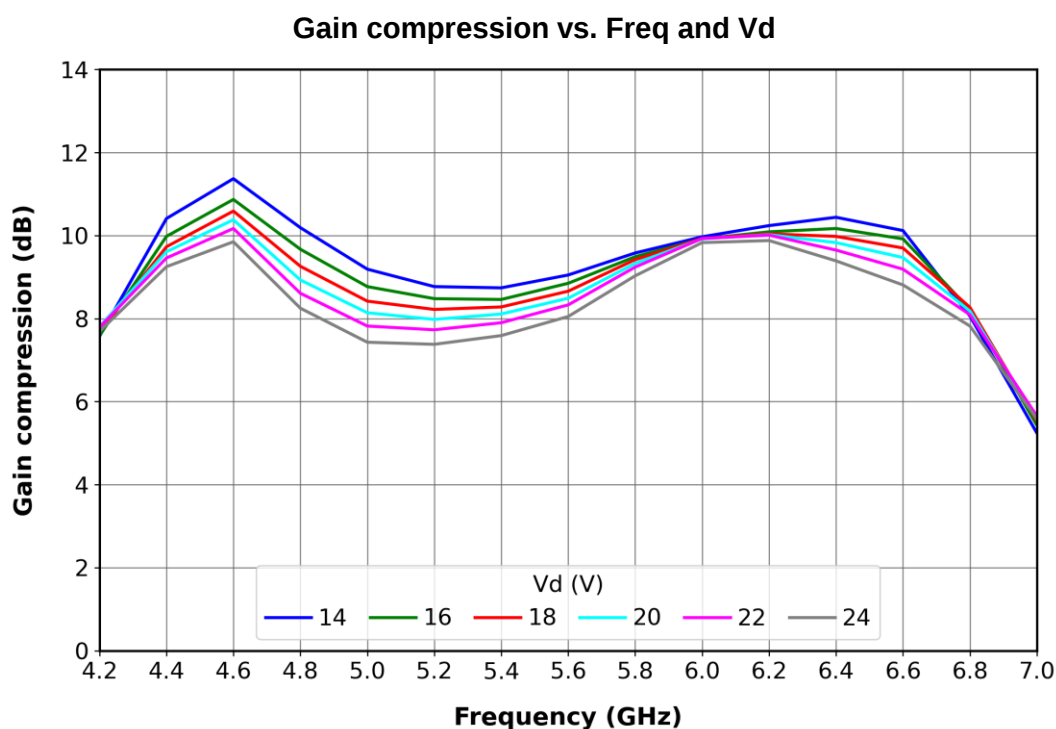
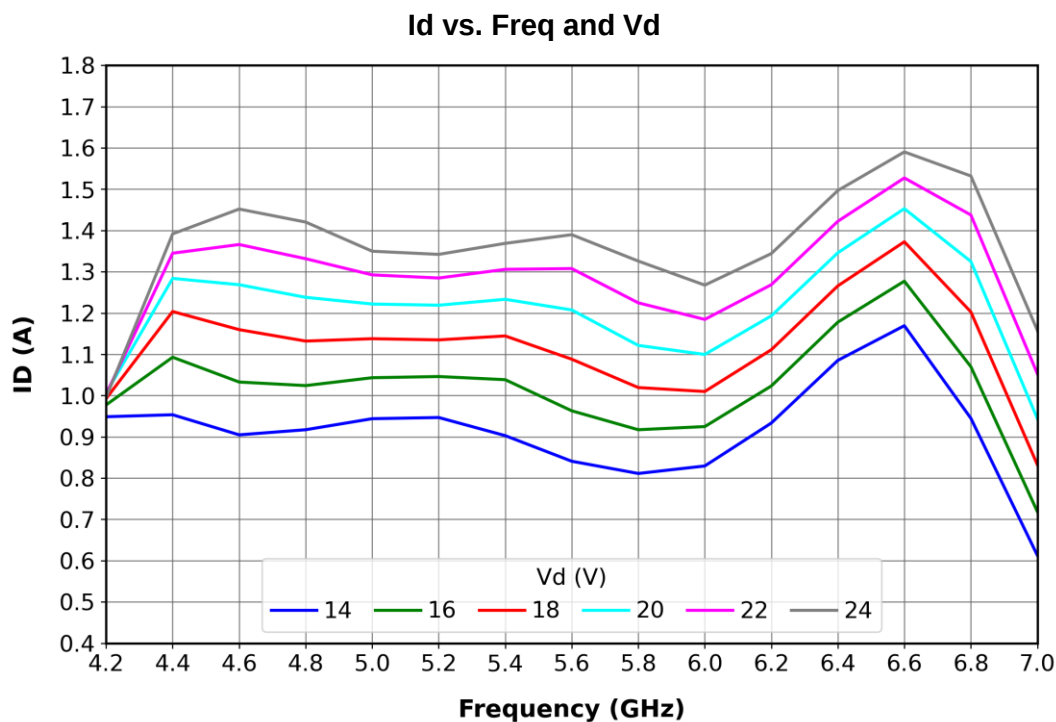
Test conditions : CW, $T_{\text{case}} = 25^{\circ}\text{C}$, $I_{\text{dQ}} = 315\text{mA}$, $\text{Pin} = 19\text{dBm}$

**Advanced Information**

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes

Test conditions : CW, $T_{\text{case}} = 25^{\circ}\text{C}$, $I_{\text{dQ}} = 315\text{mA}$, $P_{\text{in}} = 19\text{dBm}$



Advanced Information

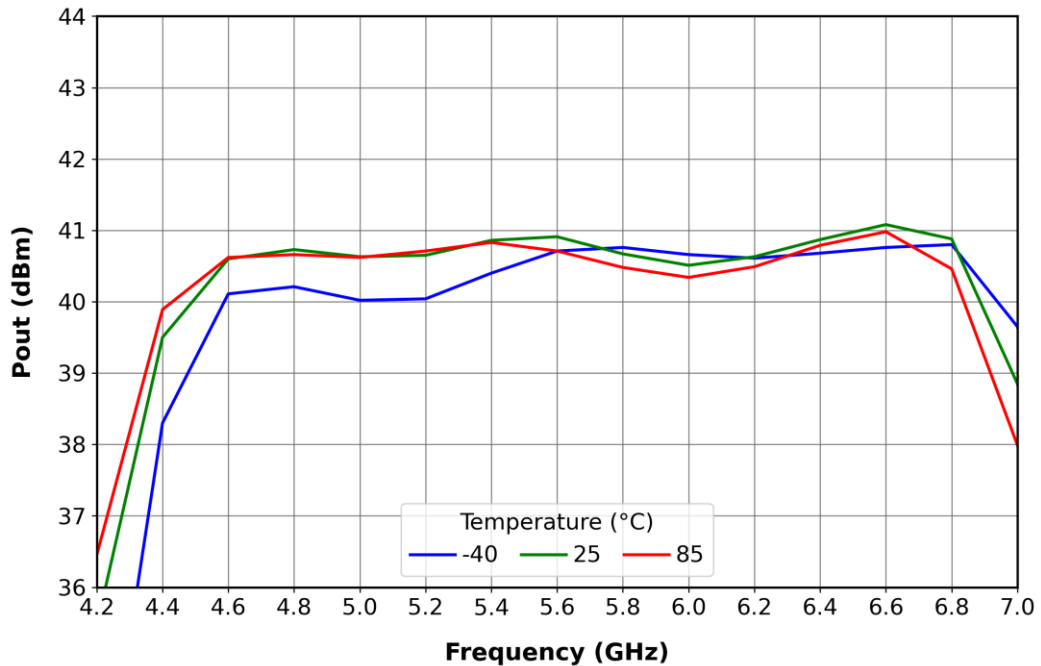
Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes

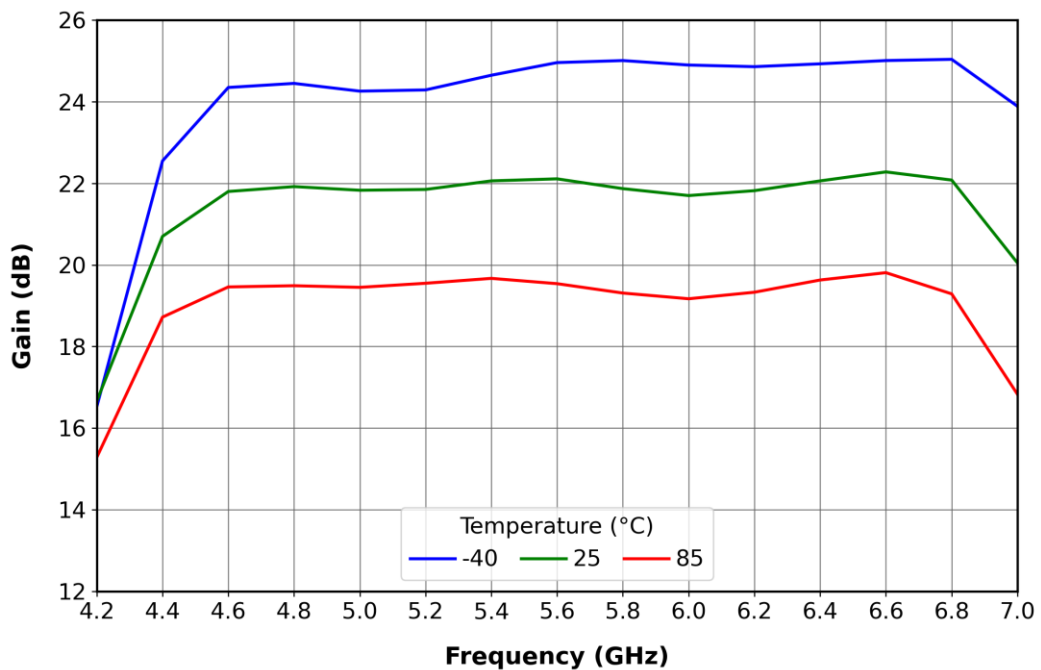
Test conditions : CW, $V_d = 18V$, $I_{dQ} = 315mA$,

$P_{in} = 16dBm@-40^{\circ}C$, $P_{in} = 19dBm@25^{\circ}C$, $P_{in} = 21dBm@85^{\circ}C$

Pout vs. Freq and Temperature



Gain vs. Freq and Temperature



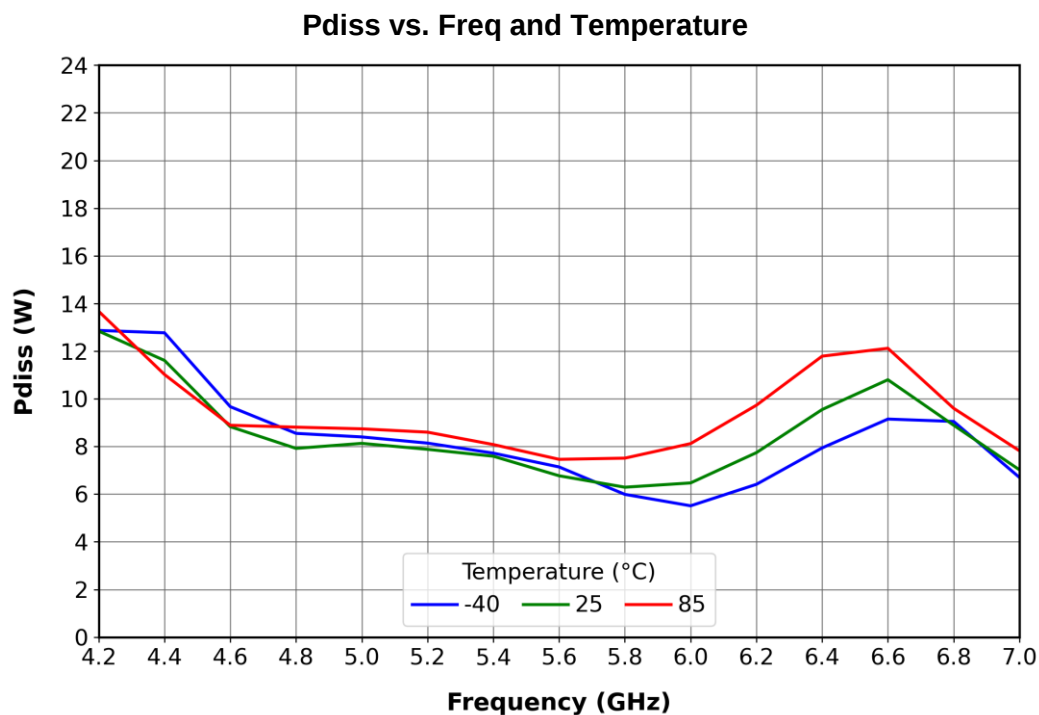
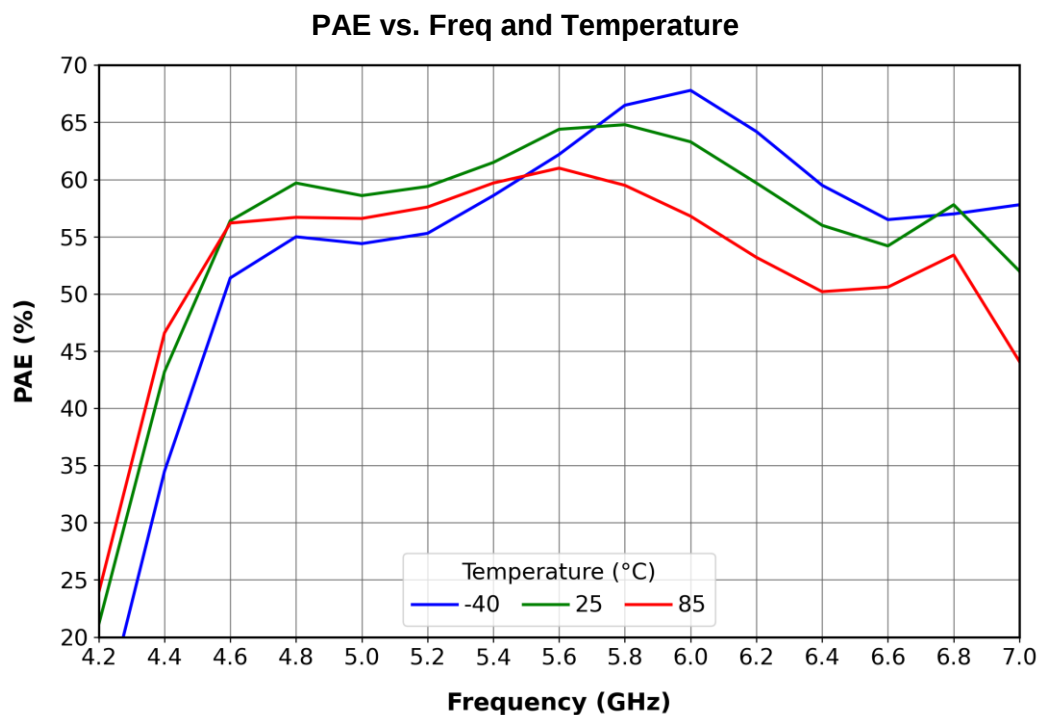
Advanced Information

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes

Test conditions : CW, $V_d = 18V$, $I_{dq} = 315mA$,

$P_{in} = 16dBm@-40^{\circ}C$, $P_{in} = 19dBm@25^{\circ}C$, $P_{in} = 21dBm@85^{\circ}C$



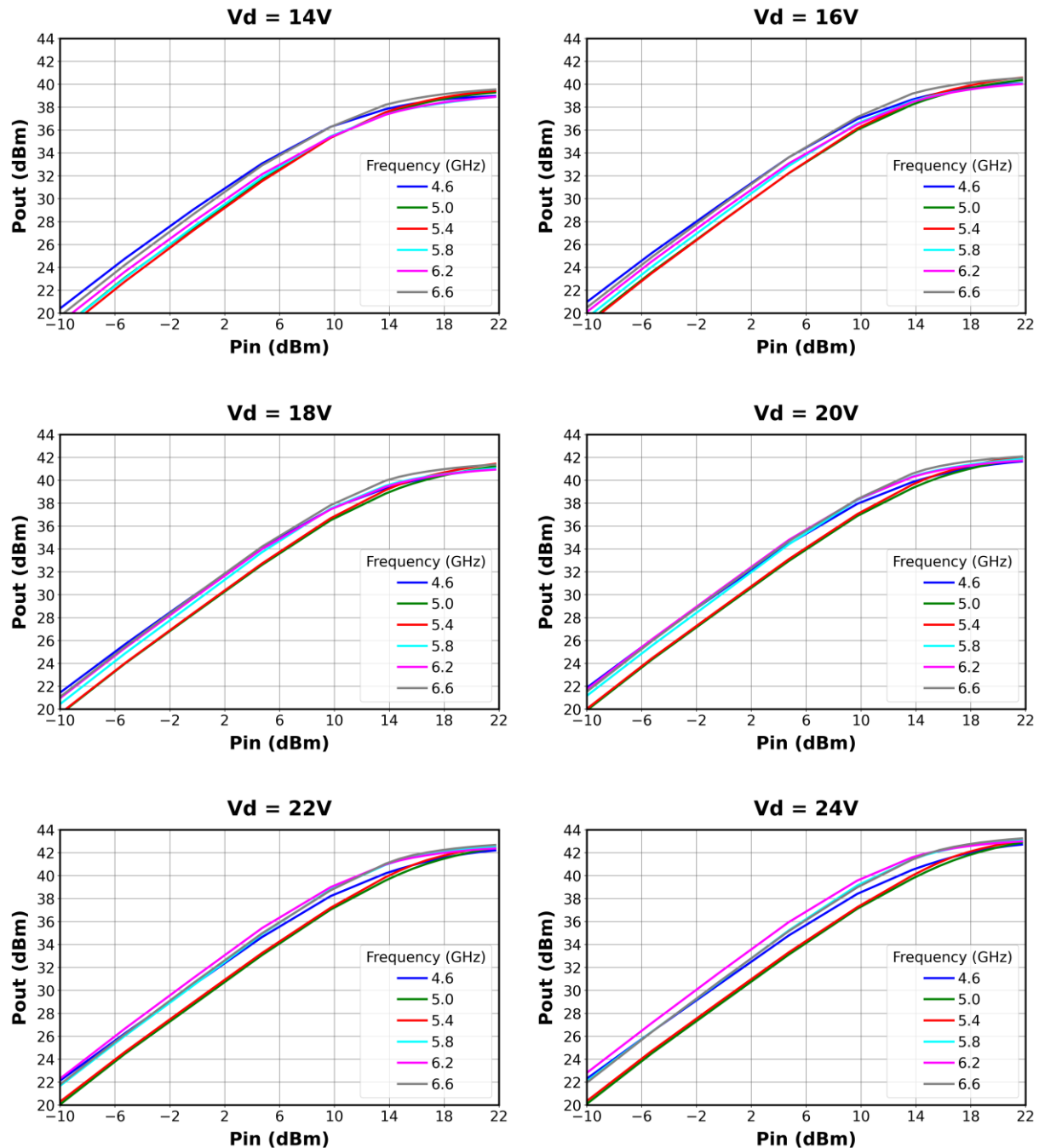
Advanced Information

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, $T_{case} = 25^{\circ}\text{C}$, $I_{dq} = 315\text{mA}$

Pout vs. Pin and Freq for different Vd



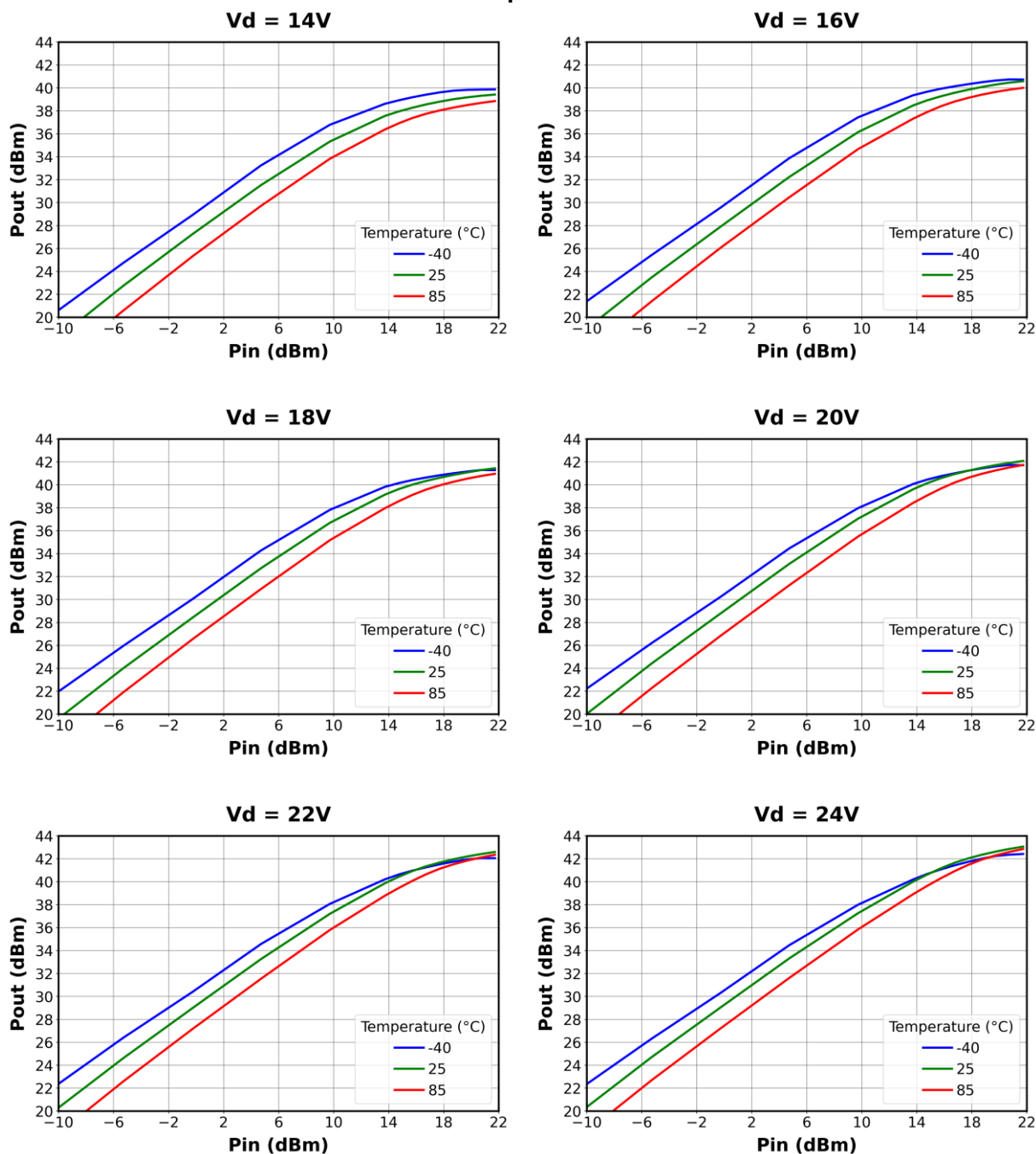
Advanced Information

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, Freq = 5.4GHz, Idq = 315mA

Pout vs. Pin and Temperature for different Vd



Advanced Information

Ref. : AI24135212 - 31 Jul 25

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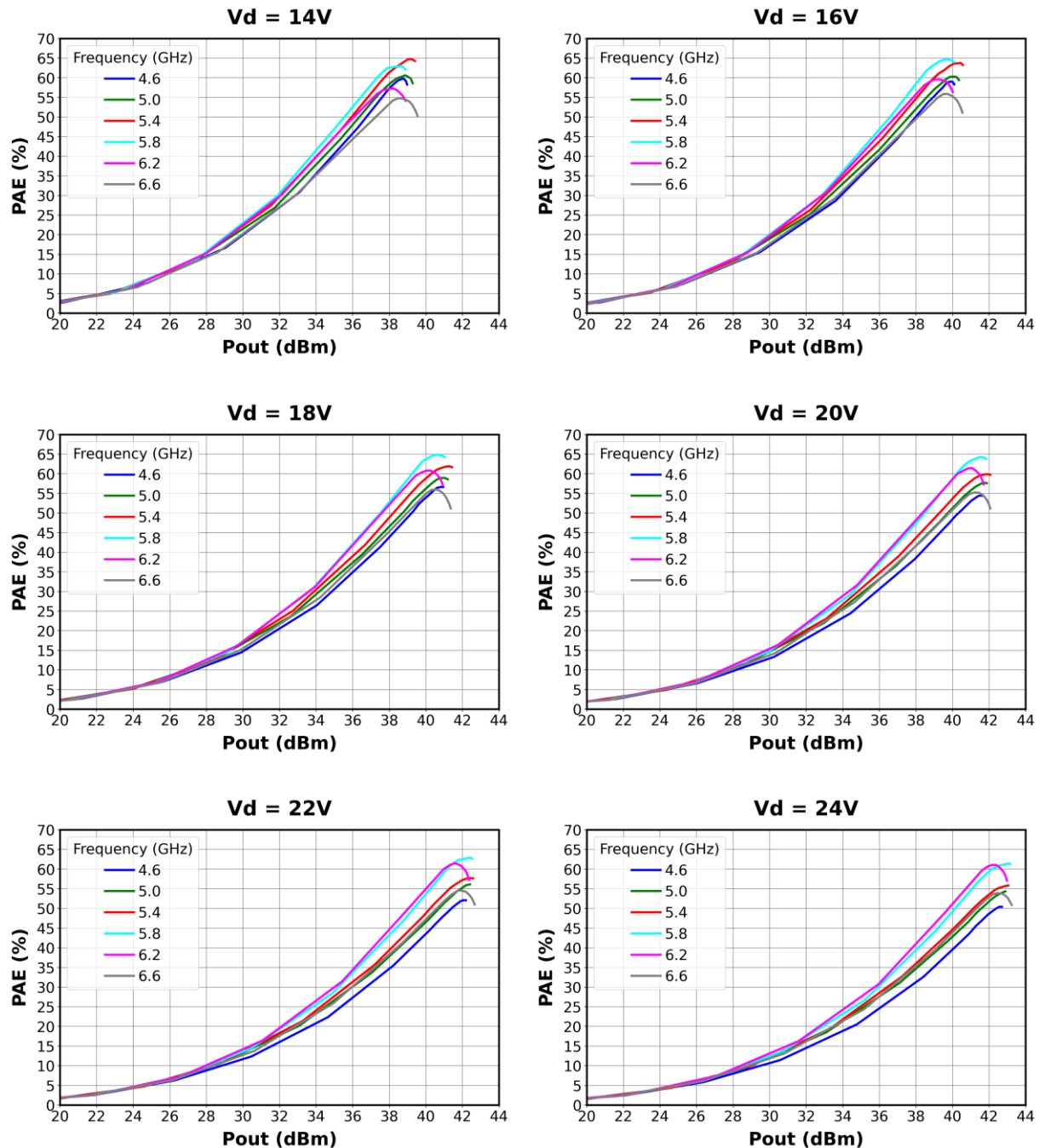
Subject to change without notice

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, $T_{\text{case}} = 25^{\circ}\text{C}$, $I_{\text{dQ}} = 315\text{mA}$

PAE vs. Pout and Freq for different Vd



Advanced Information

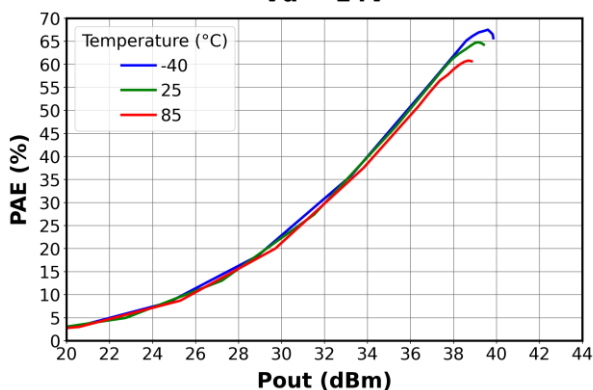
Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

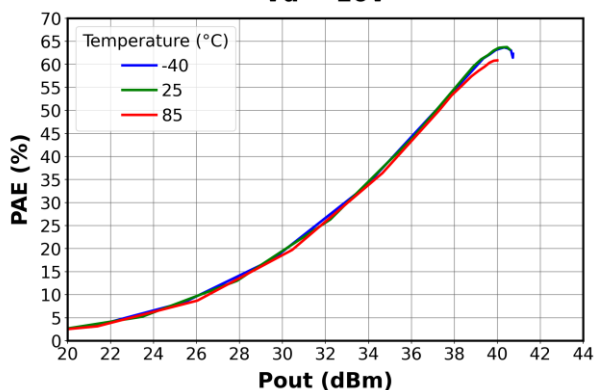
Test conditions : CW, Freq = 5.4GHz, Idq = 315mA

PAE vs. Pout and Temperature for different Vd

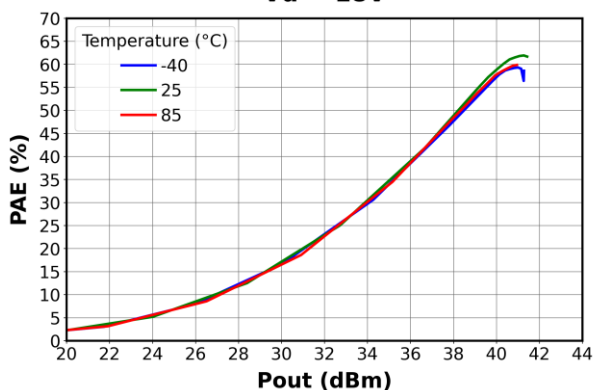
Vd = 14V



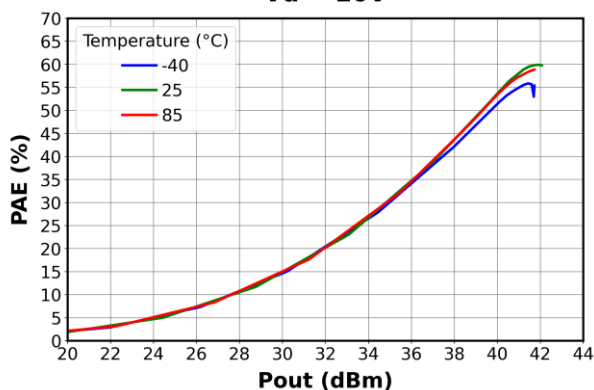
Vd = 16V



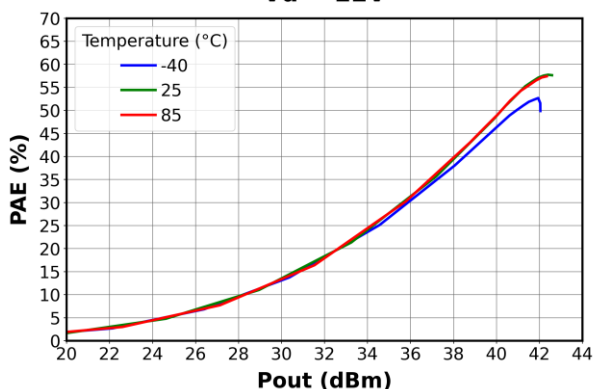
Vd = 18V



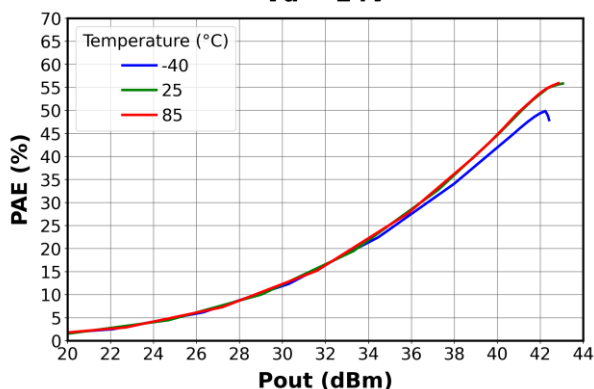
Vd = 20V



Vd = 22V



Vd = 24V



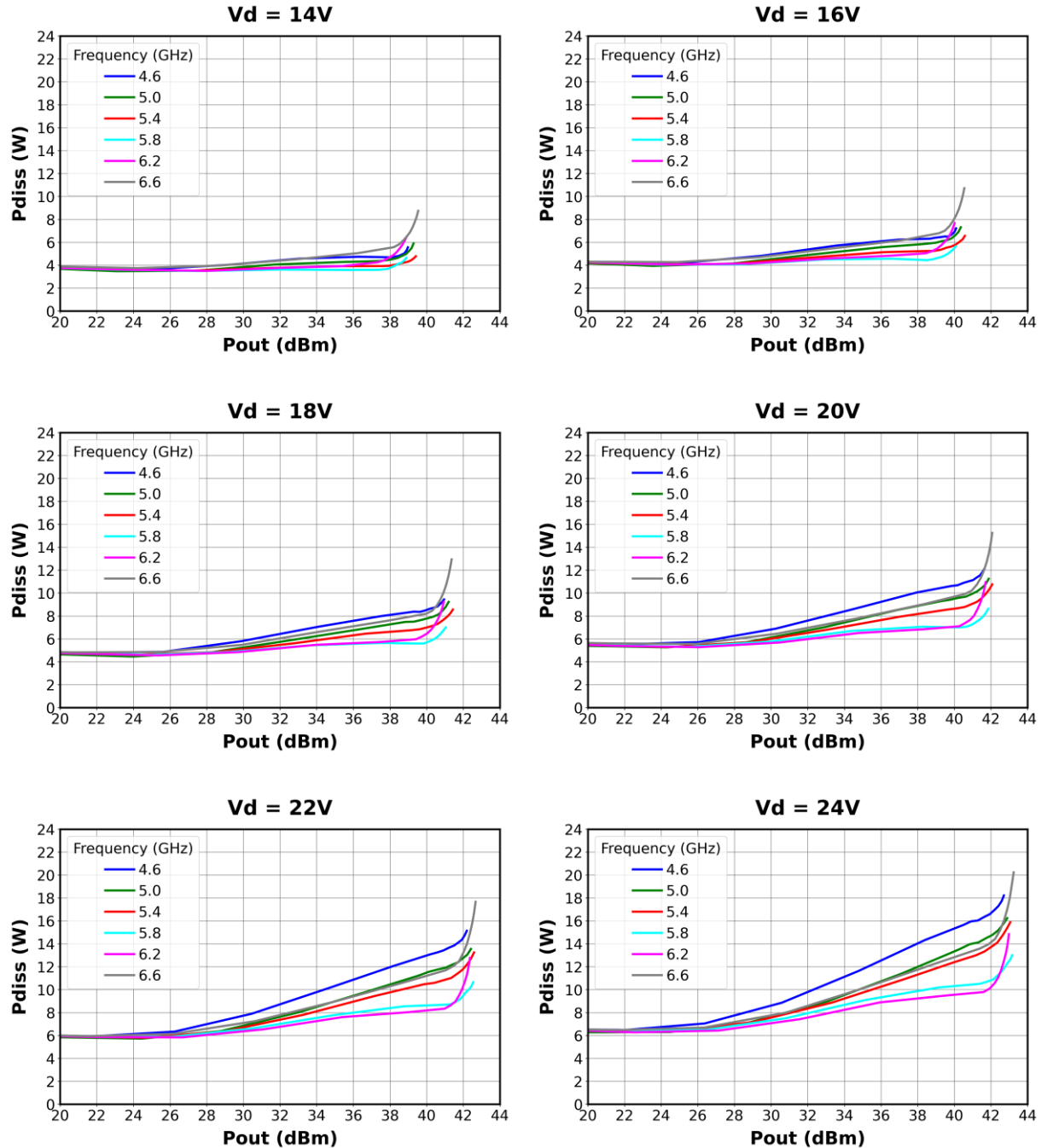
Advanced Information

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, $T_{case} = 25^{\circ}\text{C}$, $I_{dq} = 315\text{mA}$

Pdiss vs. Pout and Freq for different Vd



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Ref. : AI24135212 - 31 Jul 25

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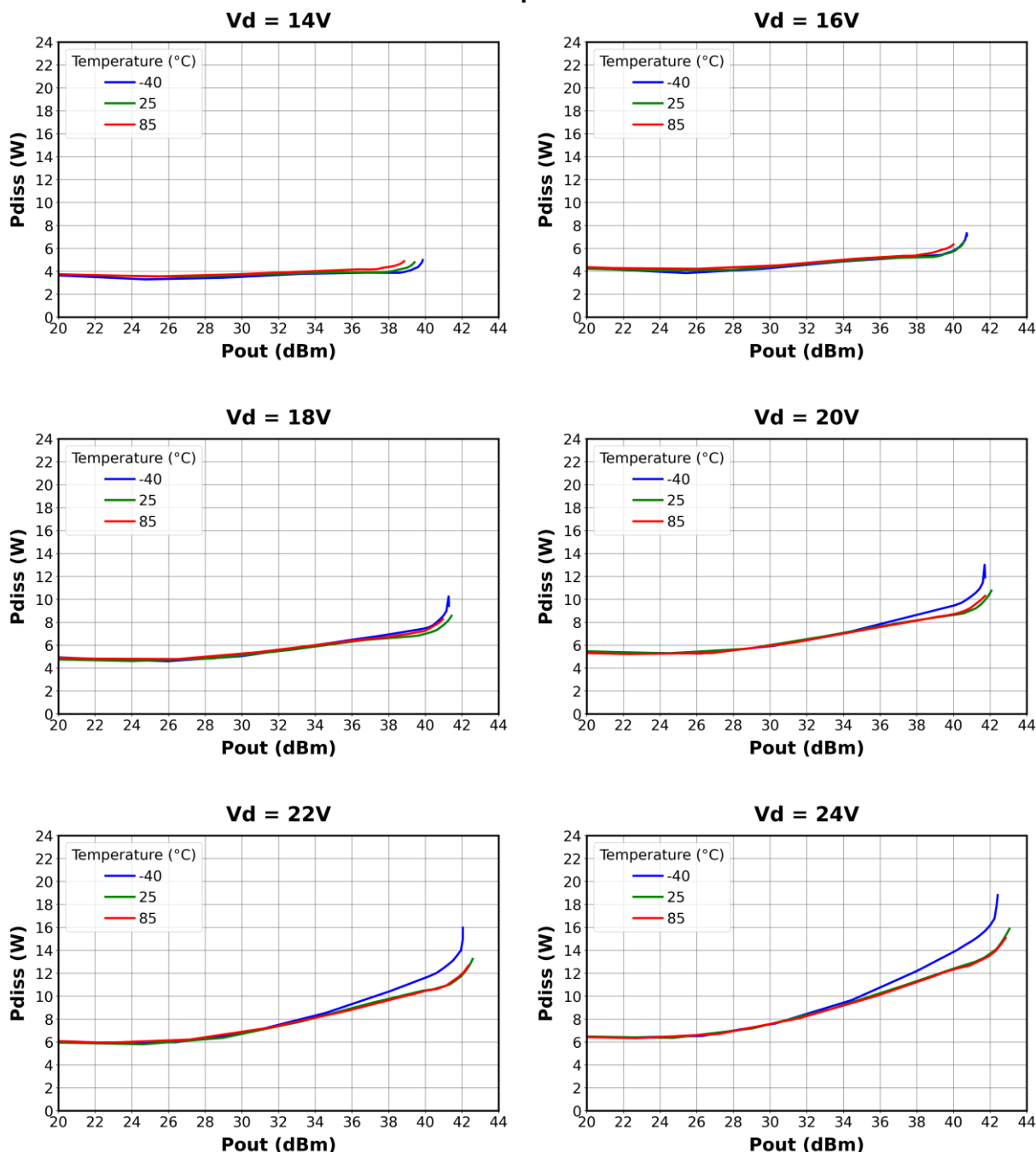
Subject to change without notice

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, Freq = 5.4GHz, Idq = 315mA

Pdiss vs. Pout and Temperature for different Vd



Advanced Information

Ref. : AI24135212 - 31 Jul 25

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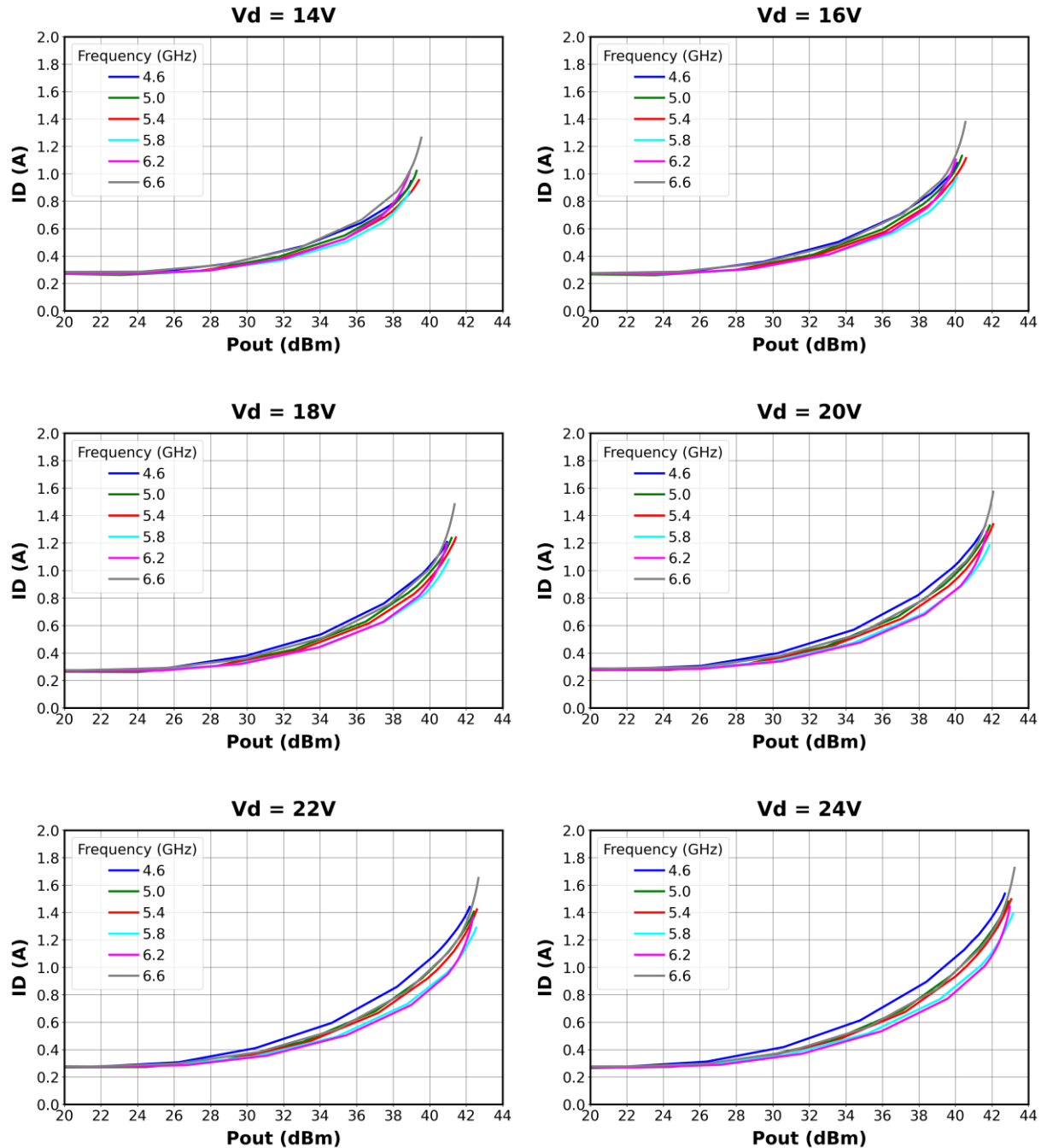
Subject to change without notice

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, $T_{\text{case}} = 25^{\circ}\text{C}$, $I_{\text{dq}} = 315\text{mA}$

Id vs. Pout and Freq for different Vd



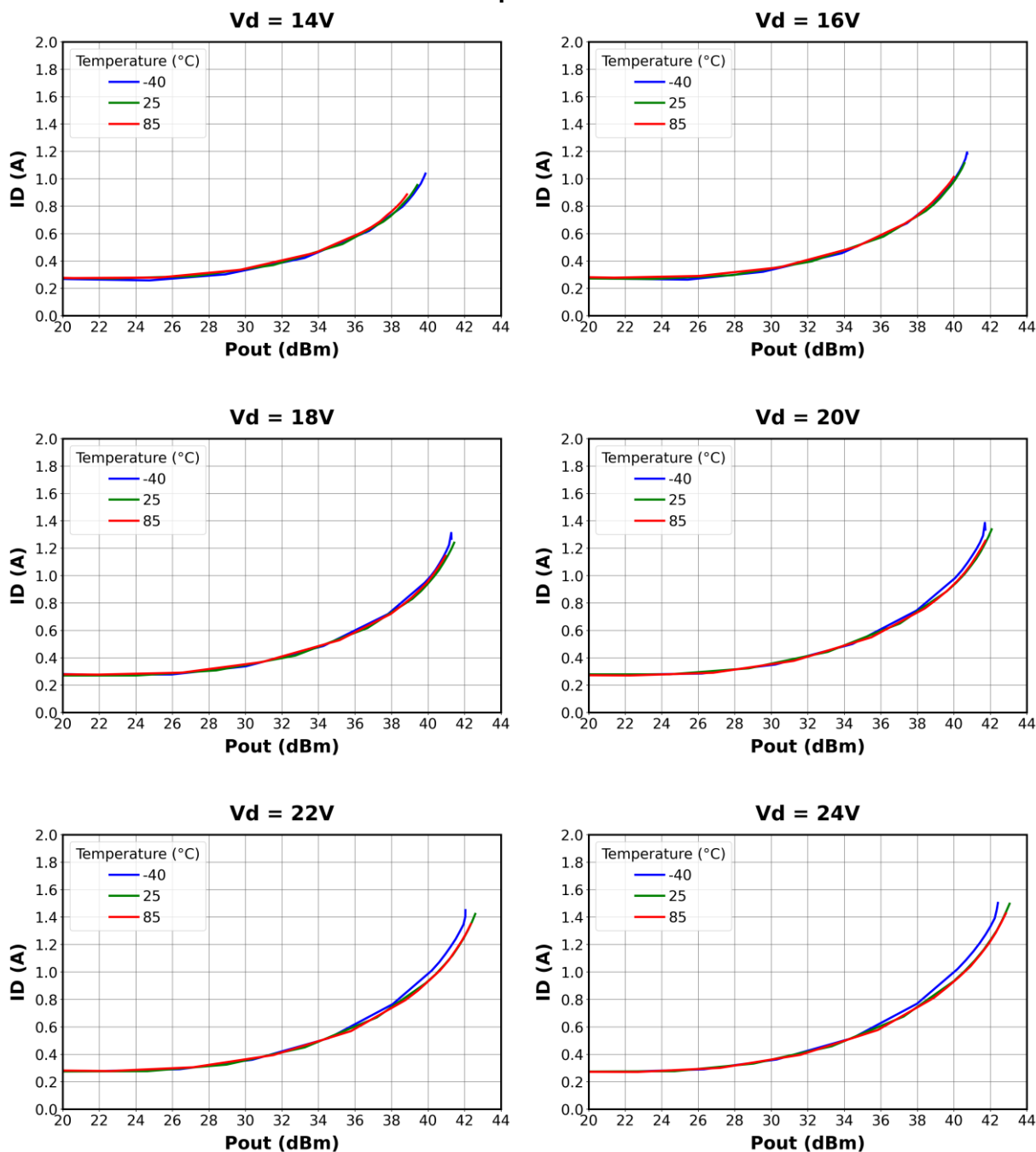
Advanced Information

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, Freq = 5.4GHz, Idq = 315mA

Id vs. Pout and Temperature for different Vd



Advanced Information

Ref. : AI24135212 - 31 Jul 25

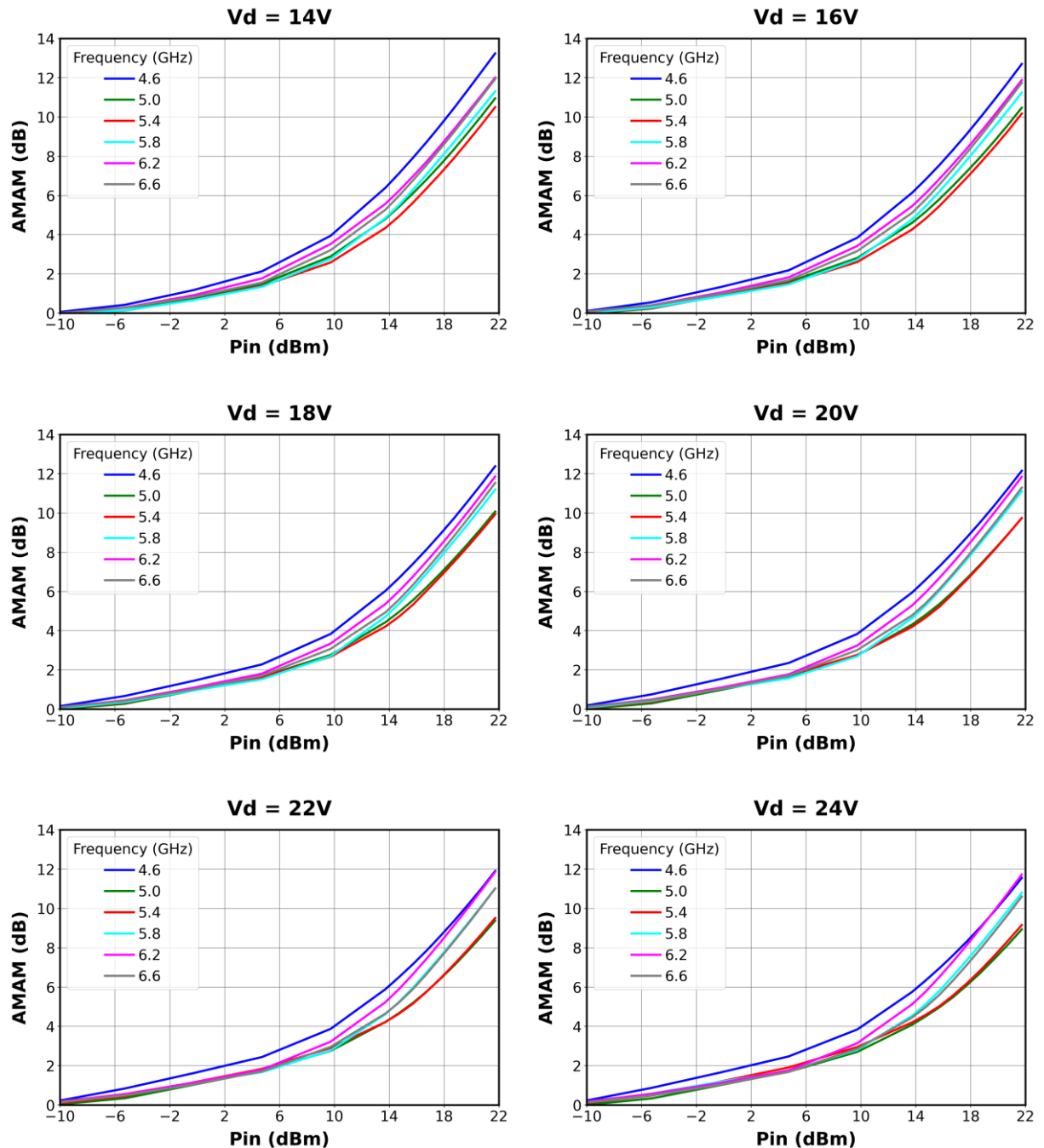
18/26

Subject to change without notice

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, $T_{\text{case}} = 25^{\circ}\text{C}$, $I_{\text{dq}} = 315\text{mA}$

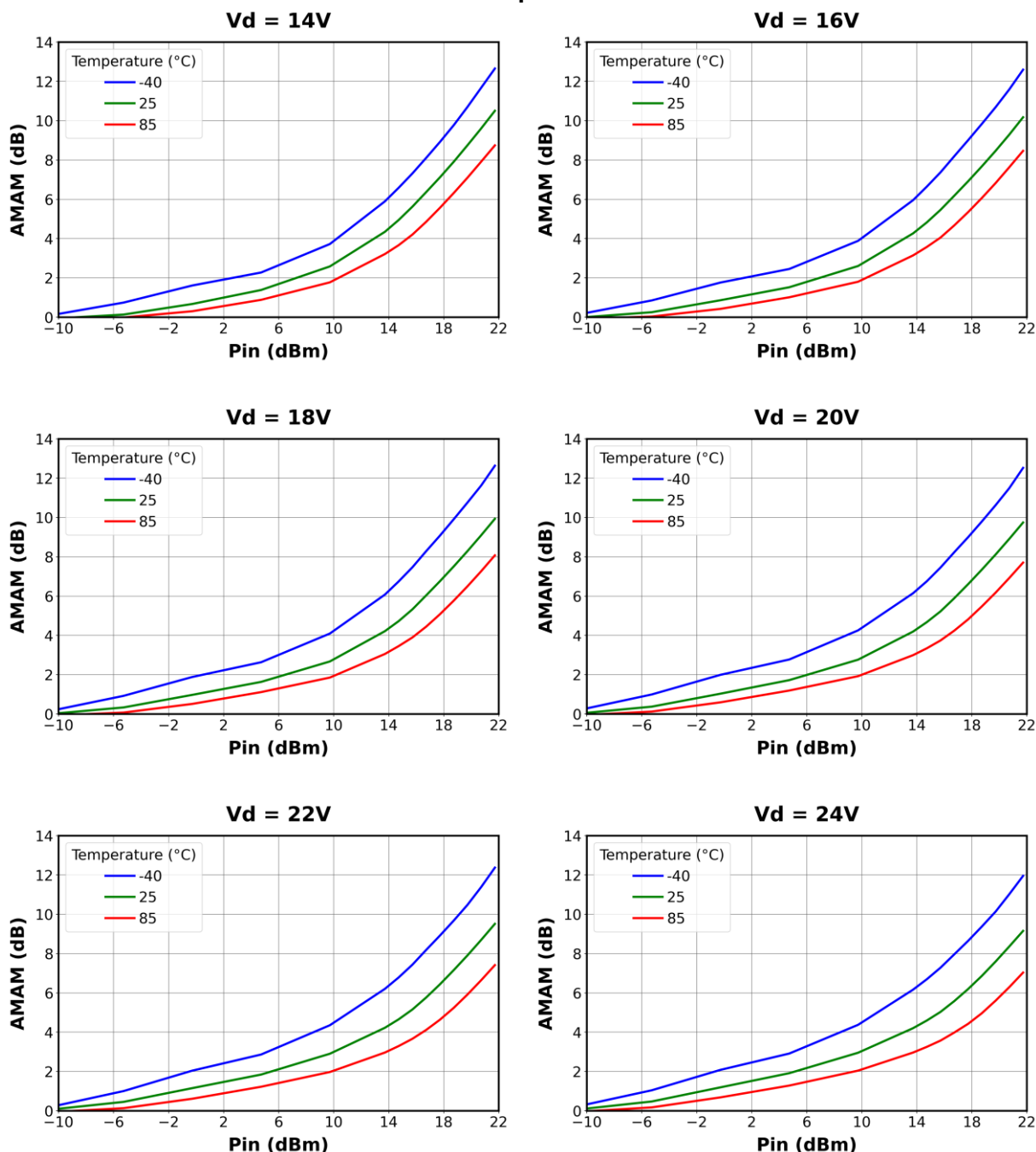
AMAM vs. Pin and Freq for different Vd**Advanced Information**

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, Freq = 5.4GHz, Idq = 315mA, Freq = 5.4GHz

AMAM vs. Pin and Temperature for different Vd



Advanced Information

Ref. : AI24135212 - 31 Jul 25

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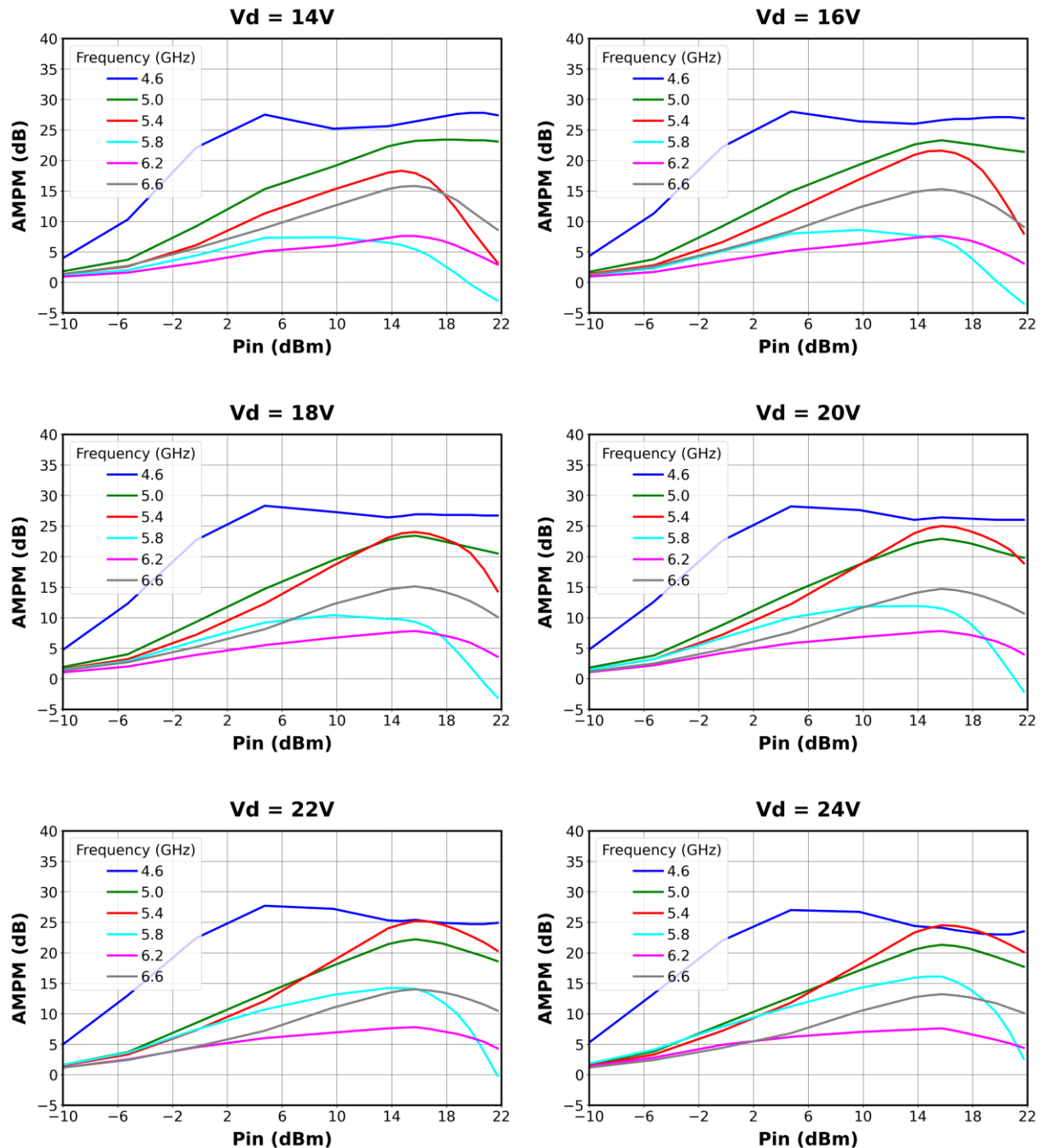
Subject to change without notice

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, $T_{\text{case}} = 25^{\circ}\text{C}$, $I_{\text{dq}} = 315\text{mA}$

AMPM vs. Pin and Freq for different Vd



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Ref. : AI24135212 - 31 Jul 25

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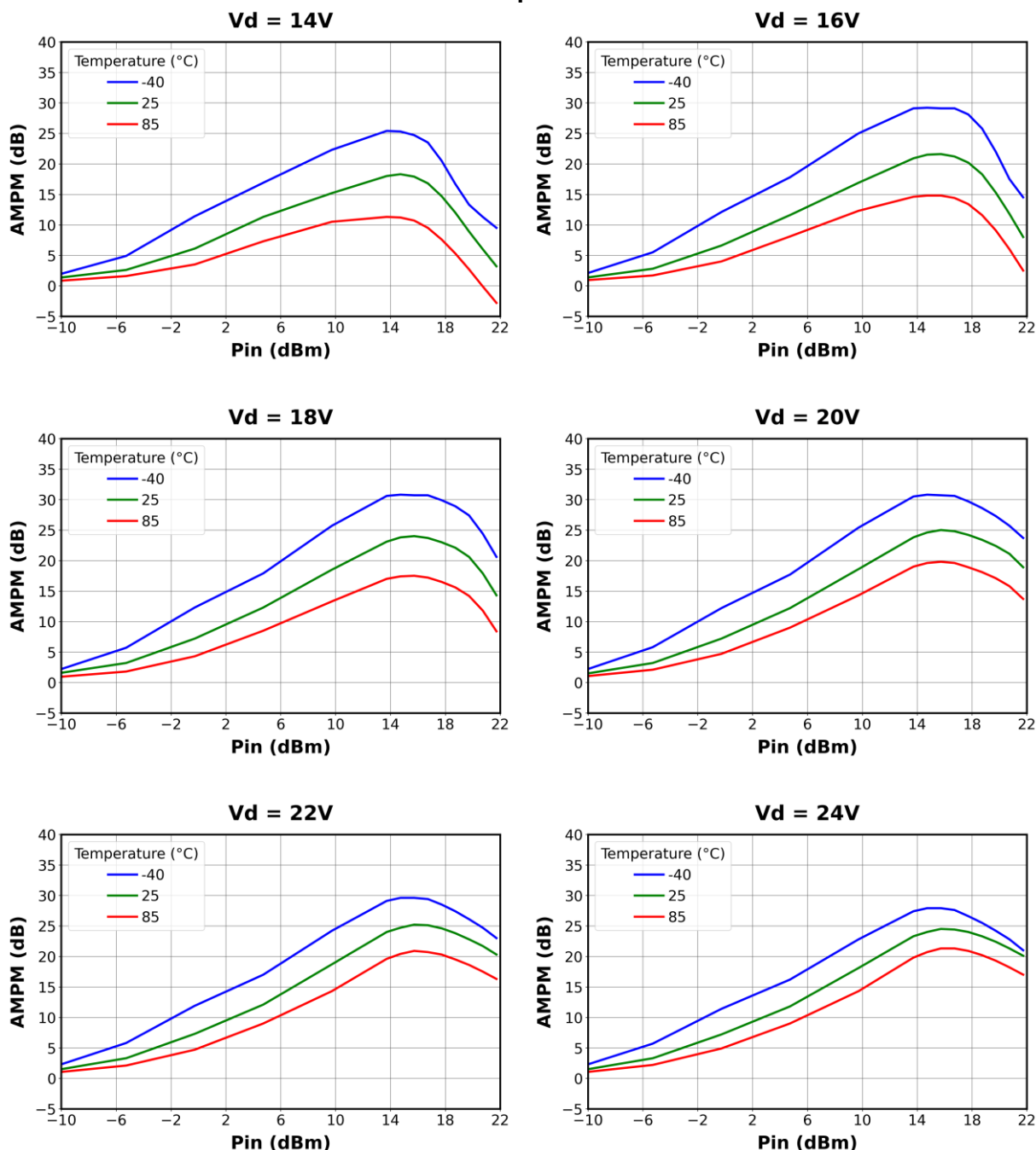
Subject to change without notice

Typical Board Measurements

Board losses are de-embedded. Measurements are given in the package reference planes.

Test conditions : CW, Freq = 5.4GHz, Idq = 315mA

AMPM vs. Pin and Temperature for different Vd



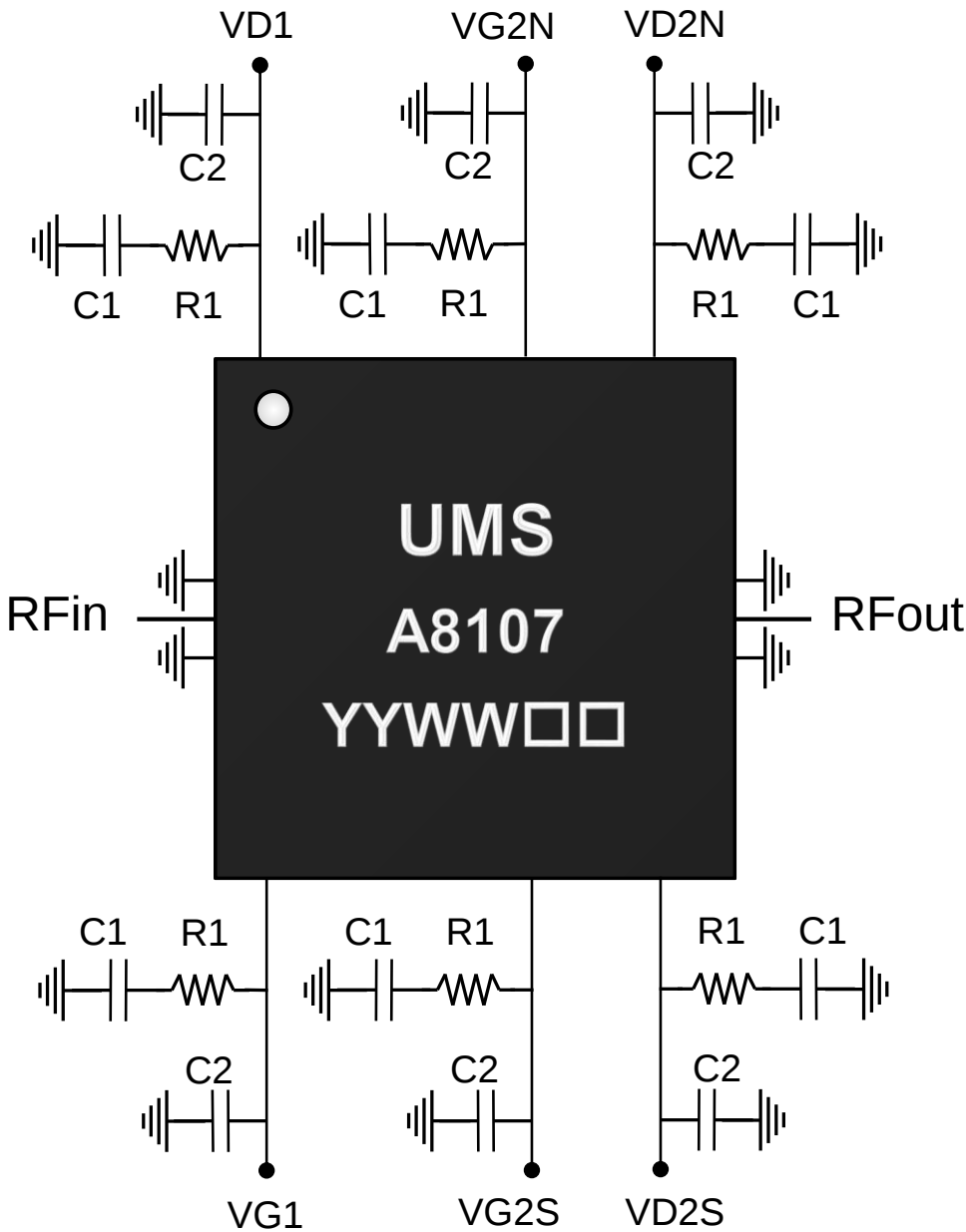
Advanced Information

Ref. : AI24135212 - 31 Jul 25

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Subject to change without notice

Recommended Assembly Plan



Bill of Materials

Label	Value	Description
C1	120pF	Capacitor 120pF ±15% 50V
R1	10Ohm	Resistor 10Ohm ±1%
C2	10nF	Capacitor 10nF ±10% 50V

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Ref. : AI24135212 - 31 Jul 25

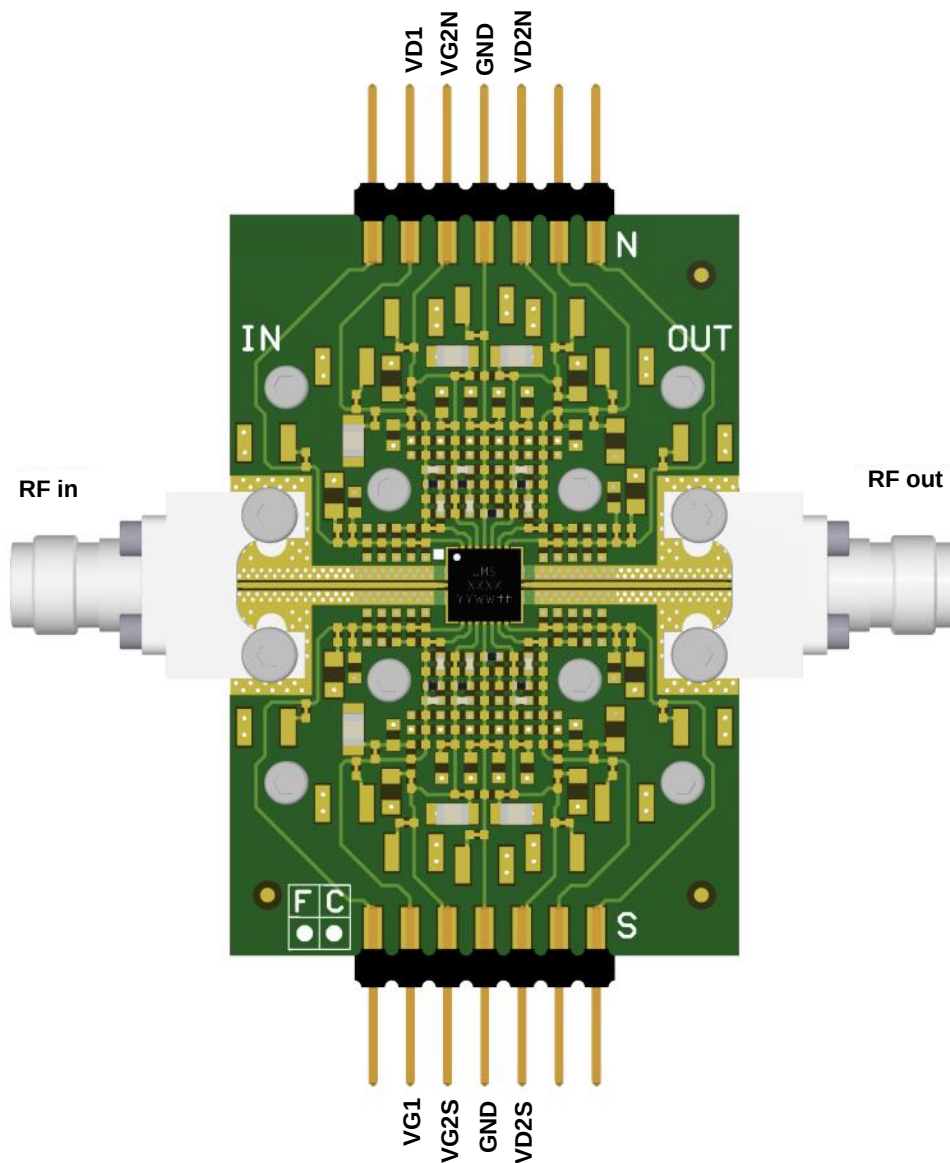
23/26

Subject to change without notice

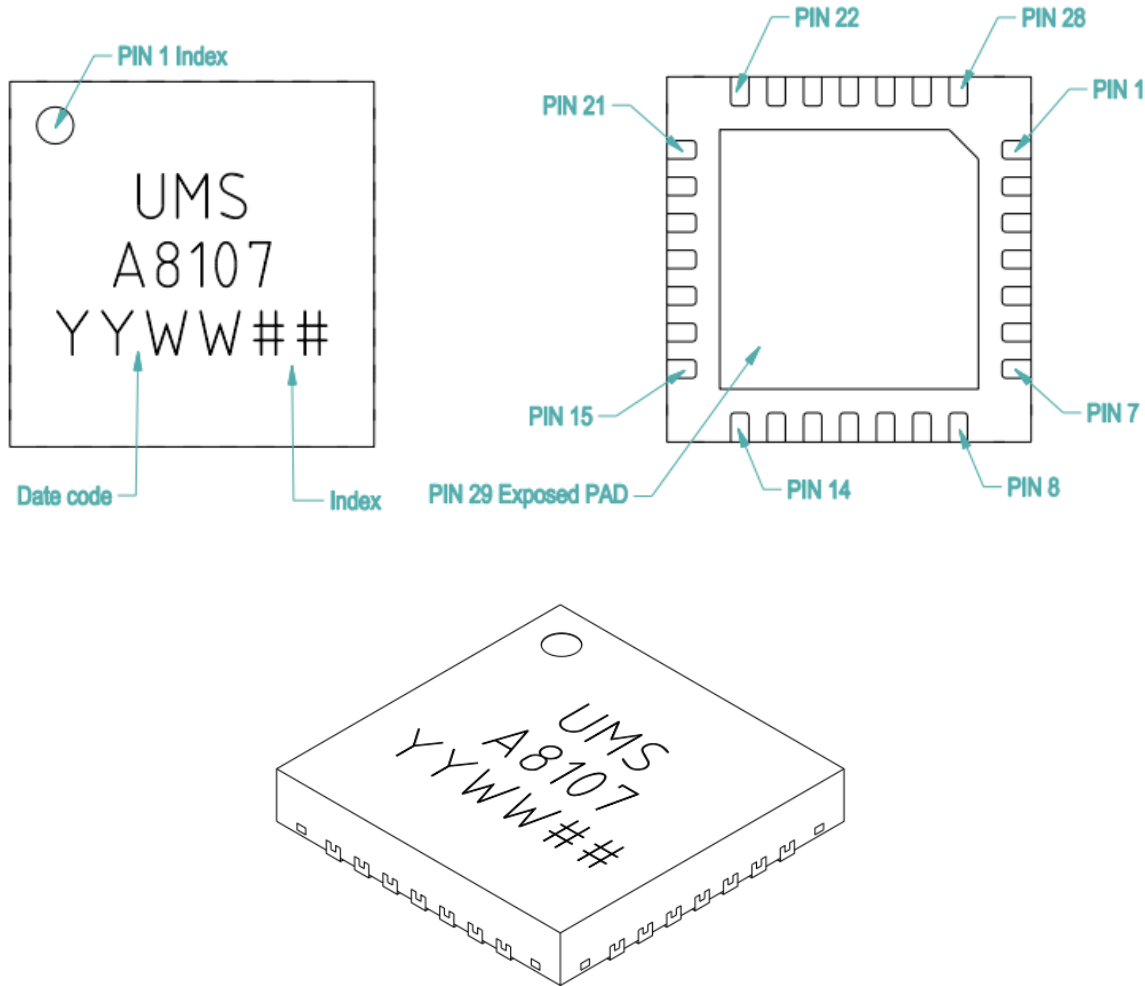


Evaluation Board

- Based on typically RO4350 / 8mils or equivalent.
- Using a micro-strip to coplanar transition to access the package.
- Recommended for the implementation of this product on a module board.
- Decoupling capacitors of 120pF + 10 Ohm, 10nF±10% are recommended for all DC accesses.
- Refer to the application note AN0031 available at <http://www.ums-rf.com> for the description of Evaluation Board for Packaged Die and recommendations for this UMS package.
- **All board measurements are performed using shielded cables, even for DC bias, to ensure safe operation.**

**Advanced Information**

Package Outline



Units :	mm	1- NC	11- GND ⁽¹⁾	21- NC
Finish :	NiPdAuAg	2- NC	12- VD2S	22- NC
MSL Rating :	MSL3	3- GND ⁽¹⁾	13- NC	23- NC
Lead Free (Green)		4- RFin	14- NC	24- VD2N
From the standard :	JEDEC MO-220 VGGD	5- GND ⁽¹⁾	15- NC	25- GND ⁽¹⁾
		6- NC	16- NC	26- VG2_N
NC :	Not Connected	7- NC	17- GND ⁽¹⁾	27- VD1
		8- NC	18- RFout	28- NC
		9- VG1	19- GND ⁽¹⁾	29- GND ⁽¹⁾
		10- VG2S	20- NC	

⁽¹⁾ It is strongly recommended to ground all pins marked “GND” through the PCB board. Ensure that the PCB board is designed to provide the best possible ground to the package.

Advanced Information



Recommended Package Footprint

Refer to the application note AN0017 available at <http://www.ums-rf.com> for package foot print recommendations.

SMD Mounting Procedure

For the mounting process standard techniques involving solder paste and a suitable reflow process can be used. For further details, see application note AN0017 available at <http://www.ums-rf.com>.

Recommended Environmental Management

UMS products are compliant with the regulation in particular with the directives RoHS N°2011/65 and REACH N°1907/2006. More environmental data are available in the application note AN0019 also available at <http://www.ums-rf.com>.

Recommended ESD Management

Refer to the application note AN0020 available at <http://www.ums-rf.com> for ESD sensitivity and handling recommendations for the UMS package products.

Maturity Level

Maturity Level	Product status	Documentation	Reliability	Usage in a system
Lab Sample (LS)	Decision to develop the product is not confirmed	Technical Information	No commitment	Lab demonstrator
Engineering Sample (ES)	Design may change	Advanced Information	The design is within the recommended temperature, current and voltage ranges as regards the technology used.	Engineering demonstrator
Product Representative Unit (PRU)	Design is frozen	Data-sheet	Tests results are available on the foreseen product or on an similar one	Production

Sampling Request Reference

Package: ES-CHA8107-QCB/20
Evaluation board: EVB-CHA8107-QCB

Contact us

Web site: <https://www.ums-rf.com>

e.mail: mktsales@ums-rf.com

Phone: +33 (1) 69 86 32 00 (France)
+1 (781) 791-5078 (USA)
+65 9298 8316 (Singapore)

Advanced Information