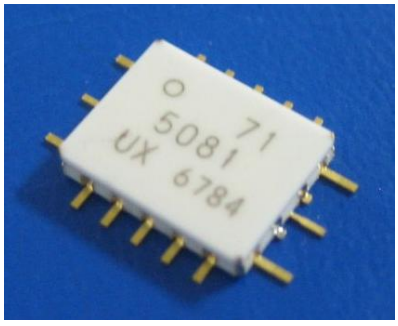
EMM5081V1B

Ku-Band Power Amplifier MMIC

FEATURES

- High Output Power: Pout=33.5dBm (typ.)
- High Linear Gain: GL=30dB (typ.)
- Impedance Matched Zin/Zout=50ohm
- Small Hermetic Metal-Ceramic SMT Package (V1B)



DESCRIPTION

The EMM5081V1B is a MMIC amplifier that contains a three-stages amplifier, internally matched, for standard communications band in the 13.75 to 14.5GHz frequency range. This product is well suited for VSAT applications as it offers high power, high gain, and low distortion. SEDI's stringent Quality Assurance Program assures the highest reliability and consistent performance.

ABSOLUTE MAXIMUM RATING

Item	Symbol	Rating	Unit
Drain-Source Voltage	VDD	10	V
Gate-Source Voltage	VGG	-3	V
Input Power	Pin	26	dBm
Storage Temperature	Tstg	-55 to +125	deg.C

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Recommend Condition	Unit
Drain-Source Voltage	VDD	=<6	V
Input Power	Pin	=<12	dBm
Operating Case Temperature	Tc	-40 to +85	deg.C

ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25deg.C)

Item	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Frequency Range	f	VDD=6.0V	13.75	-	14.5	GHz
Gate Bias Voltage	VGG(DC)	IDD(DC)=1200mA typ.	-0.01	-0.1	-0.5	V
Output Power at 1dB G.C.P.	P1dB	ZS=ZL=50ohm	32.5	33.5	-	dBm
Power Gain at 1dB G.C.P.	G1dB		26	29	-	dB
Gain Flatness	ΔG		-	1.5	2	dB
Power-added Efficiency at 1dB G.C.P.	Nadd		-	28	-	%
Third Order Intermodulation*	IM3*	*Δf=10MHz	-26	-28	-	dBc
Drain Current at 1dB G.C.P.	IDD(RF)	2-tone Test	-	1400	1700	mA
Input Return Loss (at Pin=-20dBm)	RL-in	Pout=25.5dBm S.C.L.	-	-6	-	dB
Output Return Loss (at Pin=-20dBm)	RL-out		-	-10	-	dB
Thermal Resistance	Rth		-	4.4	-	deg.C/W

1dB G.C.P. : 1dB Gain Compression Point
S.C.L. : Single Carrier Level

ESD	Class 0	up to 250V

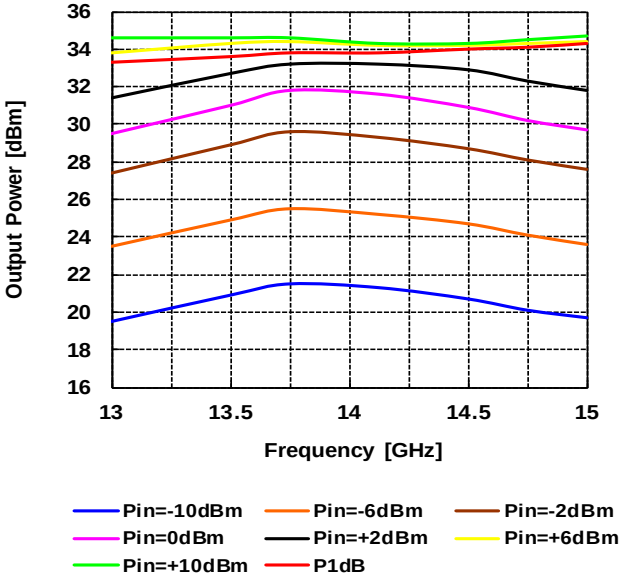
Note: Based on JEDEC JESD22-A114-C(C=100pF, R=1.5kohm)

Case Style	**V1B**

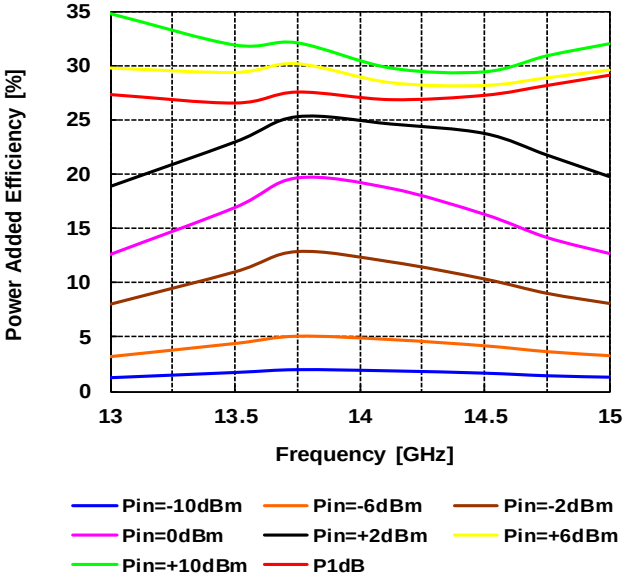
ORDERING INFORMATION

Part Number	Order Unit	Packing
EMM5081V1B	No Limitation	48pcs./Tray x 4 Tray = 192pcs./Packing
EMM5081V1BT	500pcs.	500pcs./Reel x 1 Reel = 500pcs./Packing

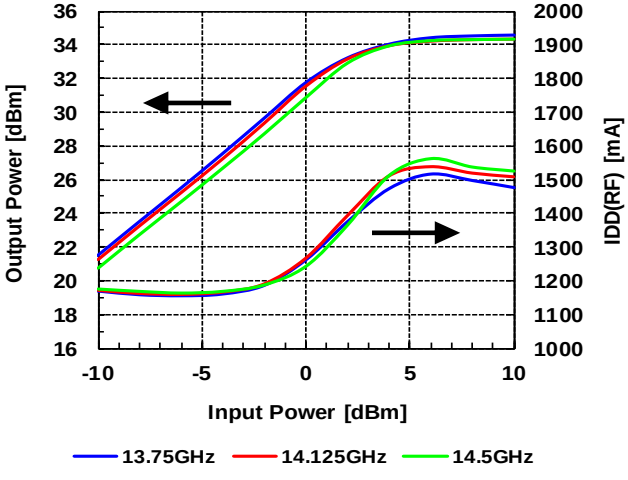
Frequency vs. Output Power
(VDD=6V, IDD(DC)=1200mA, Tc=+25deg.C)



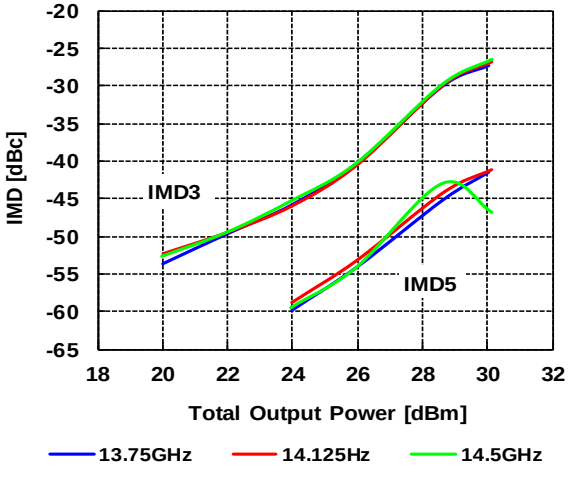
Frequency vs. Power Added-Efficiency
(VDD=6V, IDD(DC)=1200mA, Tc=+25deg.C)



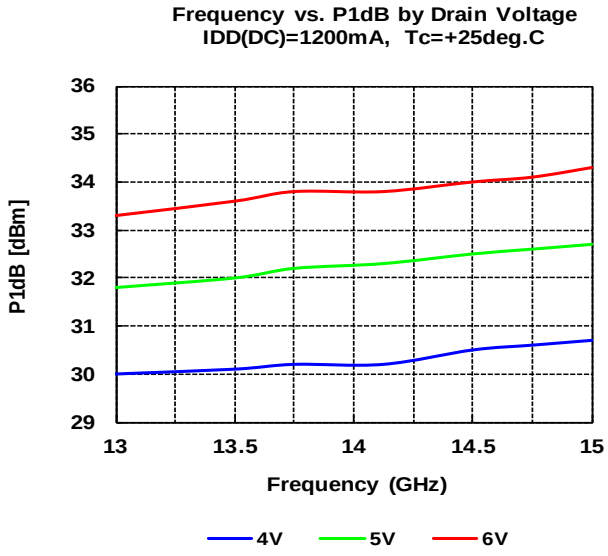
Input Power vs. Output Power, Idsr
(VDD=6V, IDD(DC)=1200mA, Tc=+25deg.C)

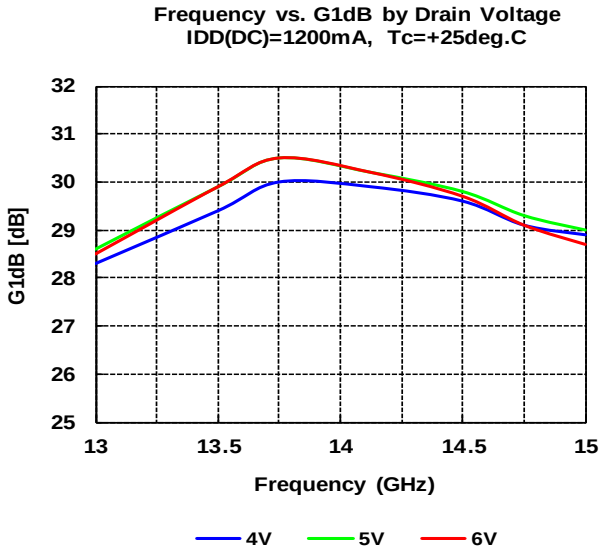


Output Power vs. IMD
(VDD=6V, IDD(DC)=1200mA, Tc=+25deg.C)

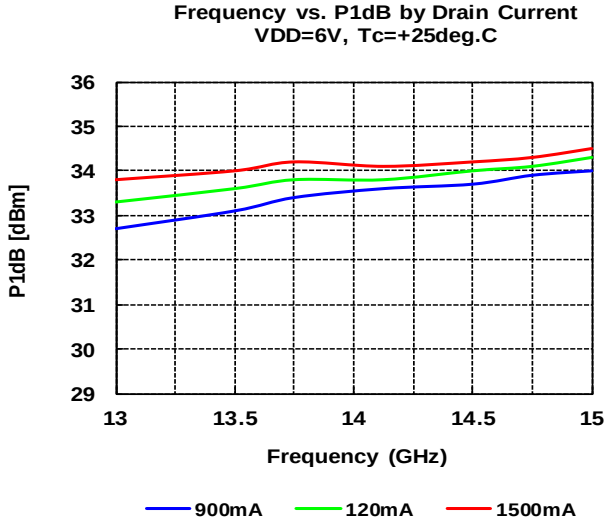


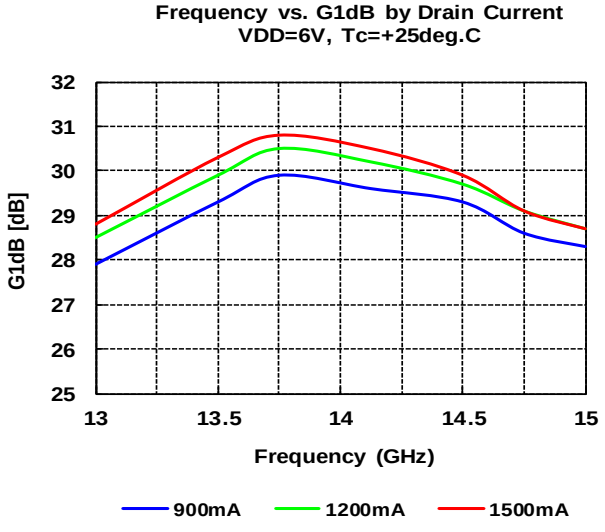
Frequency vs. P1dB,G1dB by Drain Voltage
(IDD(DC)=1200mA, Tc=+25deg.C)





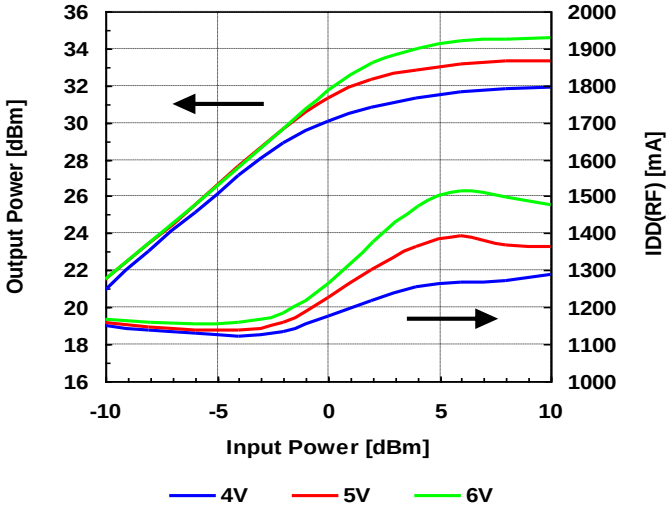
Frequency vs. P1dB,G1dB by Drain Current
(VDD=6V, Tc=+25deg.C)



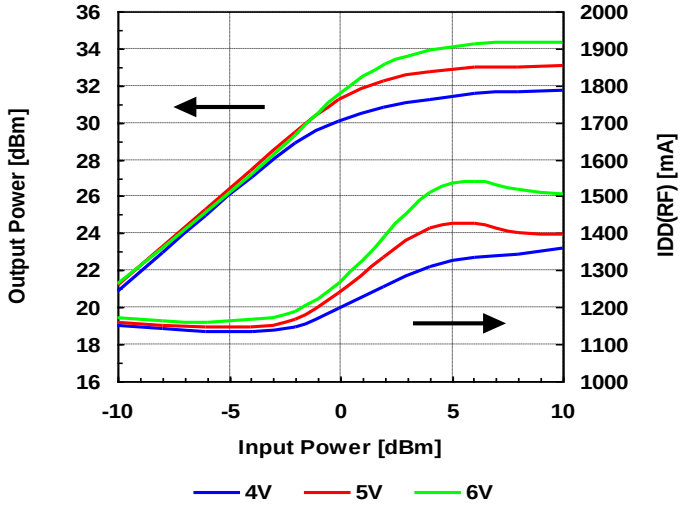


Input Power vs. Output Power, Idsr by Drain Voltage
(IDD(DC)=1200mA, Tc=+25deg.C)

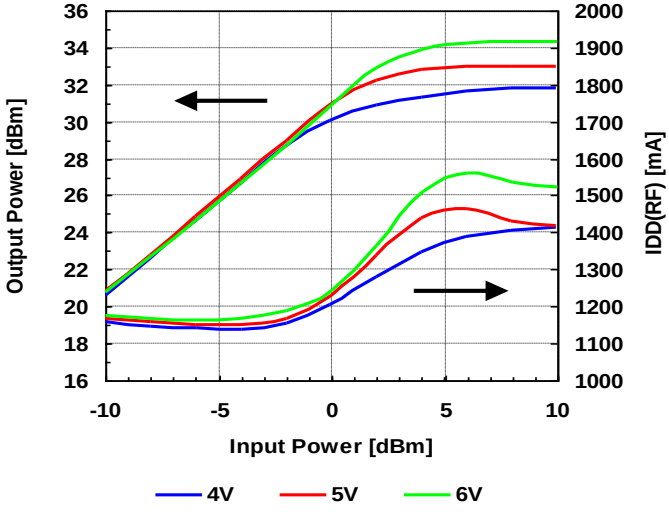
Input Power vs. Output Power by Drain Voltage
@13.75GHz, VDD=6.0V, IDD(DC)=1200mA



Input Power vs. Output Power by Drain Voltage
@14.125GHz, VDD=6.0V, IDD(DC)=1200mA

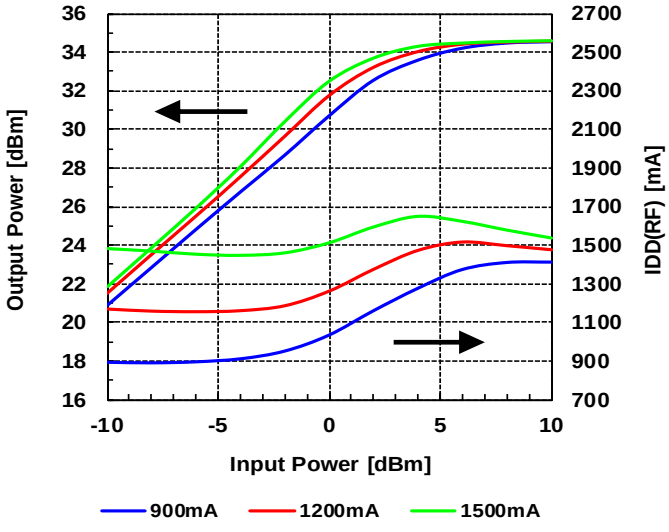


Input Power vs. Output Power by Drain Voltage
@14.5GHz, VDD=6.0V, IDD(DC)=1200mA

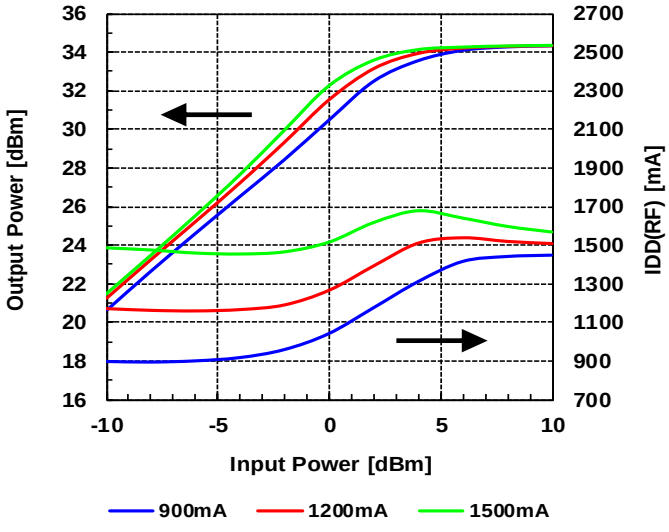


Input Power vs. Output Power, Idsr by Drain Current
(VDD=6V, Tc=+25deg.C)

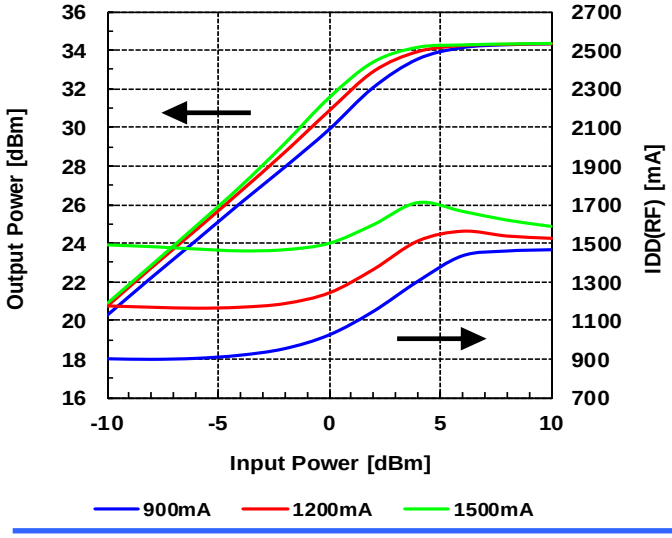
Input Power vs. Output Power by Drain Current
@13.75GHz, VDD=6.0V, Tc=+25deg.C



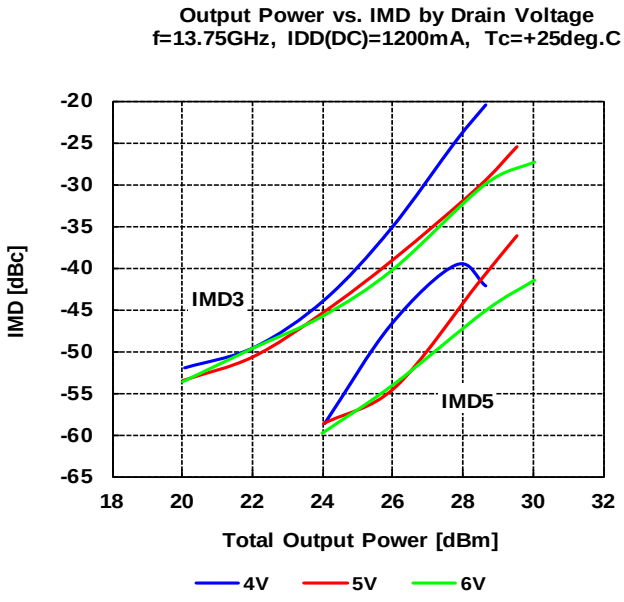
Input Power vs. Output Power by Drain Current
@14.125GHz, VDD=6.0V, Tc=+25deg.C

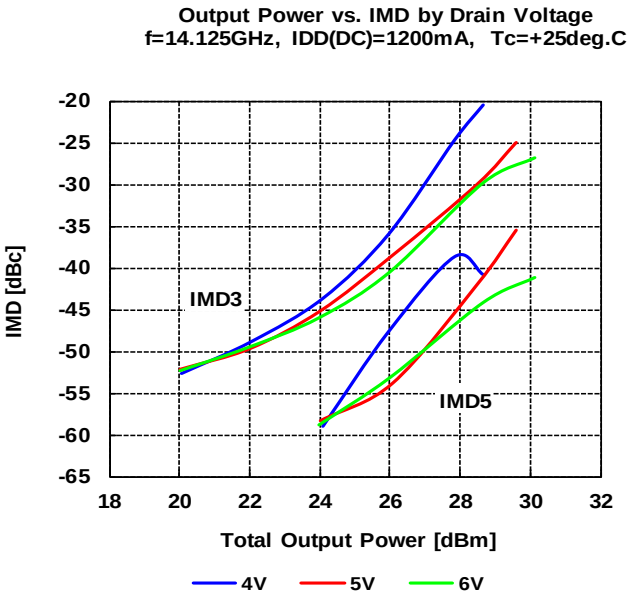


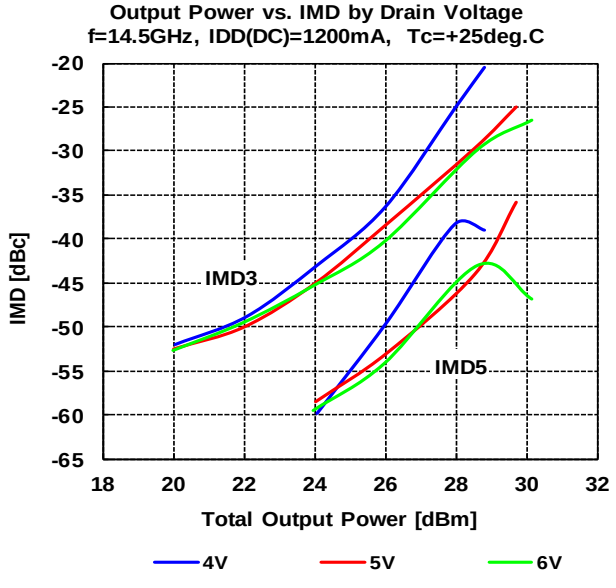
Input Power vs. Output Power by Drain Current
@14.5GHz, VDD=6.0V, Tc=+25deg.C



Output Power vs. IMD by Drain Voltage
(IDD(DC)=1200mA, Tc=+25deg.C)

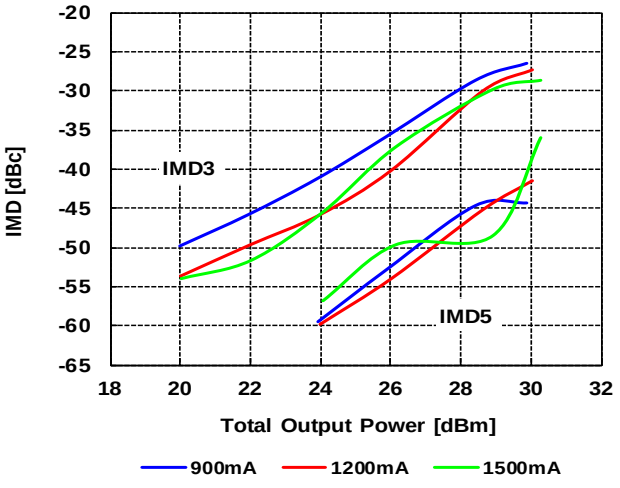




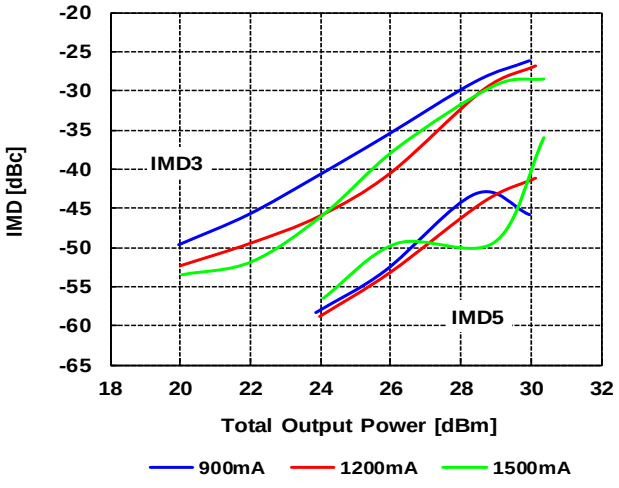


Output Power vs. IMD by Drain Current
(VDD=6V, Tc=+25deg.C)

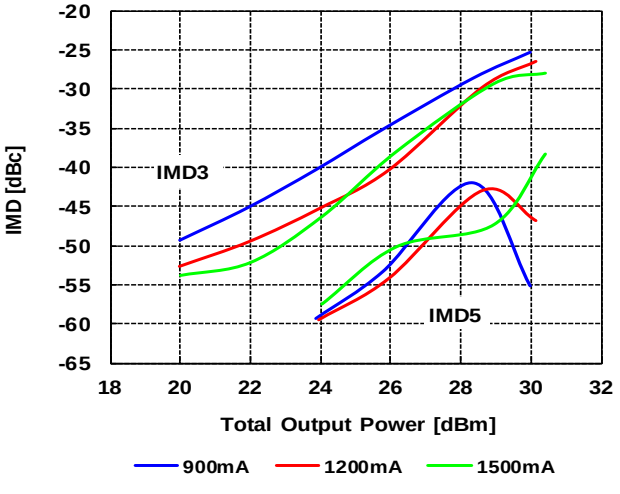
Output Power vs. IMD by Drain Current
f=13.75GHz, VDD=6V, Tc=+25deg.C



Output Power vs. IMD by Drain Curent
f=14.125GHz, VDD=6V, Tc=+25deg.C

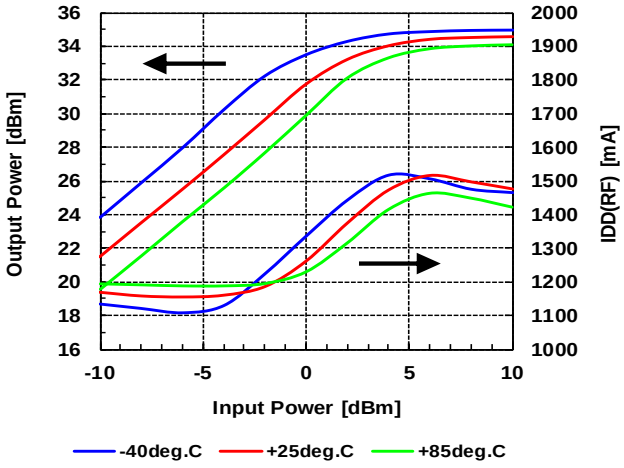


Output Power vs. IMD by Drain Current
f=14.5GHz, VDD=6V, Tc=+25deg.C

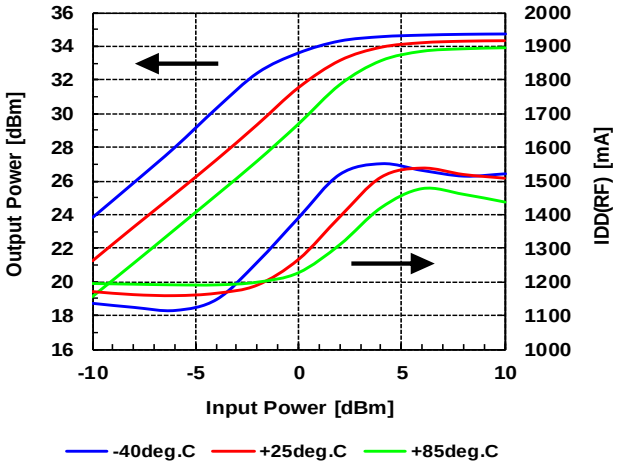


Input Power vs. Output Power by Temperature
(VDD=6V, IDD(DC)=1200mA)

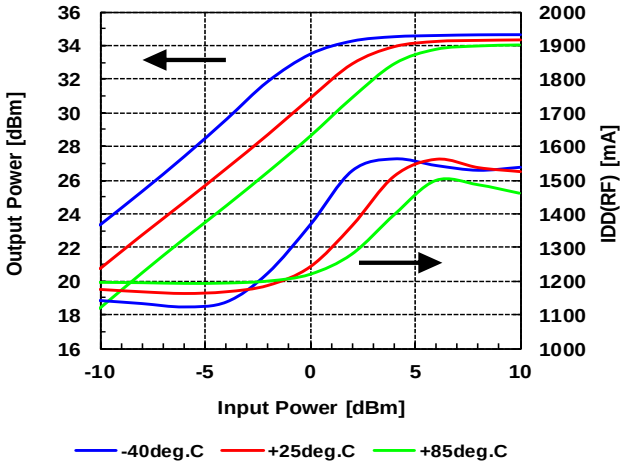
Input Power vs. Output Power by Temperature
@13.75GHz, VDD=6.0V, IDD(DC)=1200mA



Input Power vs. Output Power by Temperature
@14.125GHz, VDD=6.0V, IDD(DC)=1200mA

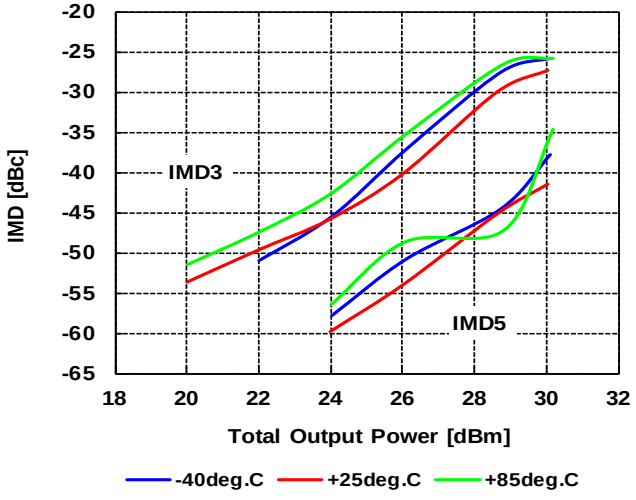


Input Power vs. Output Power by Temperature
@14.5GHz, VDD=6.0V, IDD(DC)=1200mA

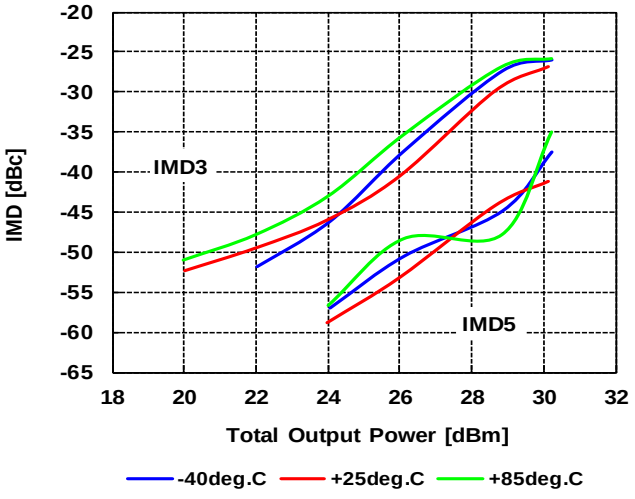


Output Power vs. IMD by Temperature
(VDD=6V, IDD(DC)=1200mA)

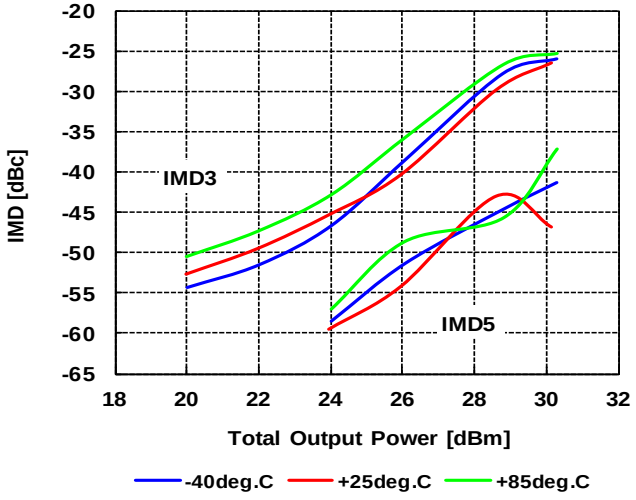
Output Power vs. IMD by Temperature
f=13.75GHz, VDD=6V, IDD(DC)=1200mA



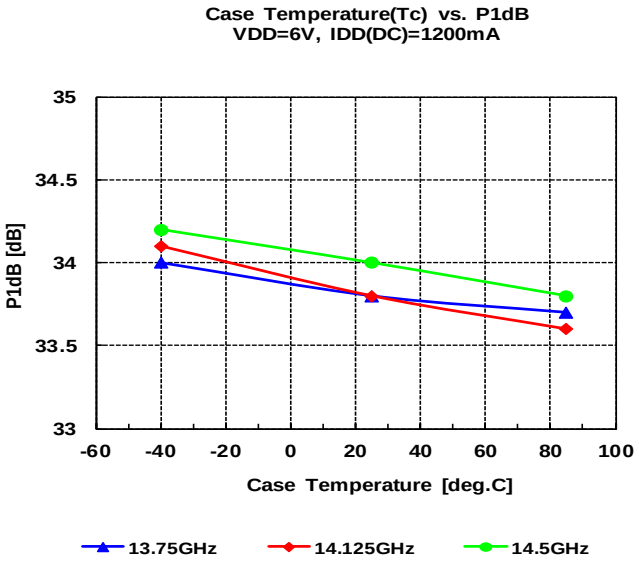
Output Power vs. IMD by Temperature
f=14.125GHz, VDD=6V, IDD(DC)=1200mA

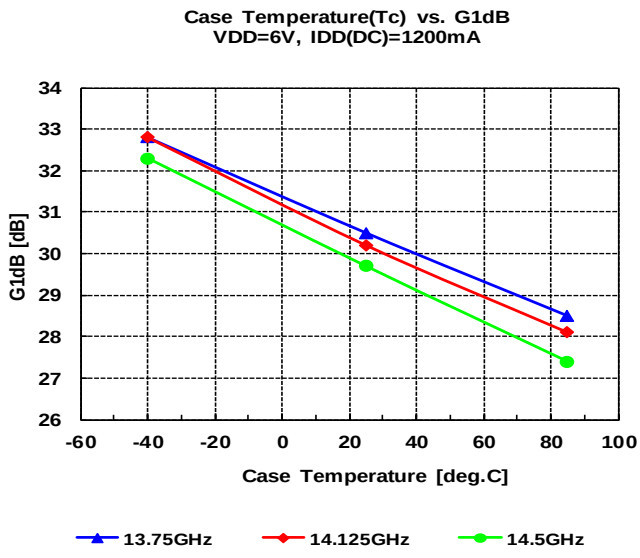


Output Power vs.IMD by Temperature
f=14.5GHz, VDD=6V, IDD(DC)=1200mA



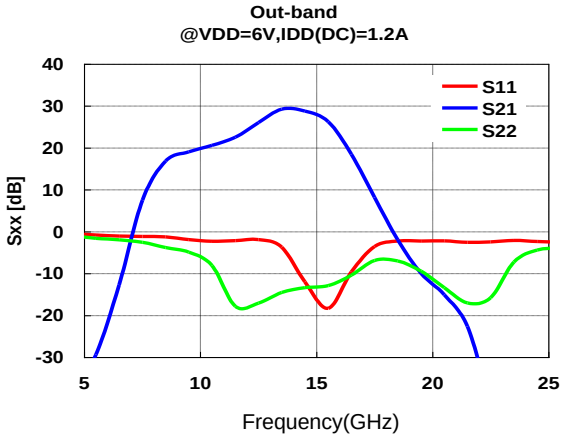
Temperature vs. P1dB, G1dB
(VDD=6V, IDD(DC)=1200mA)

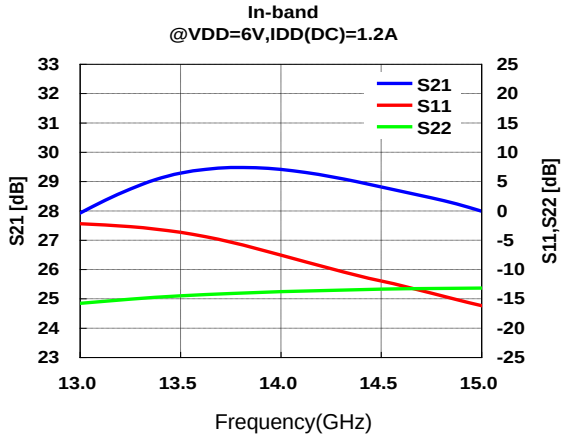




S-parameter

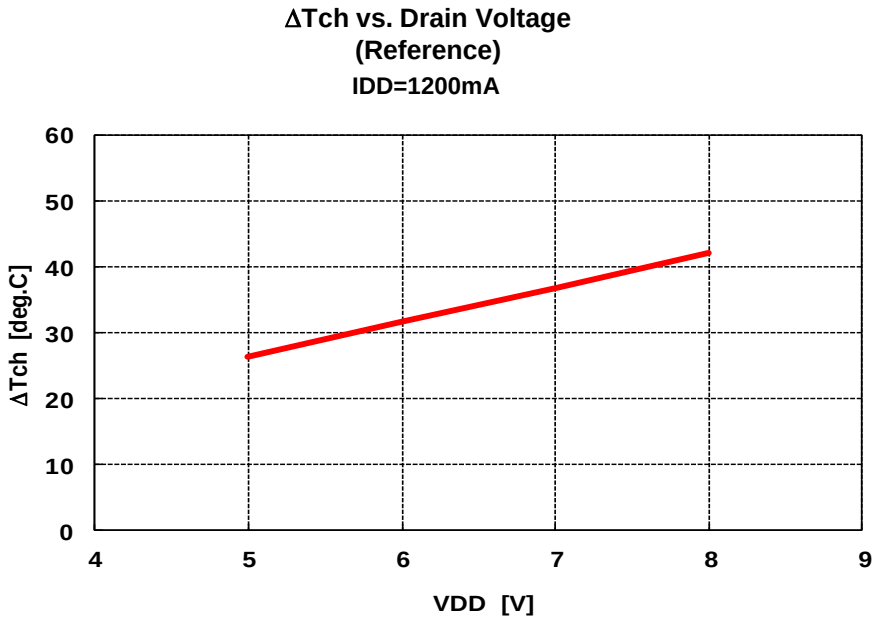
(VDD=6V, IDD(DC)=1200mA, Tc=+25deg.C)



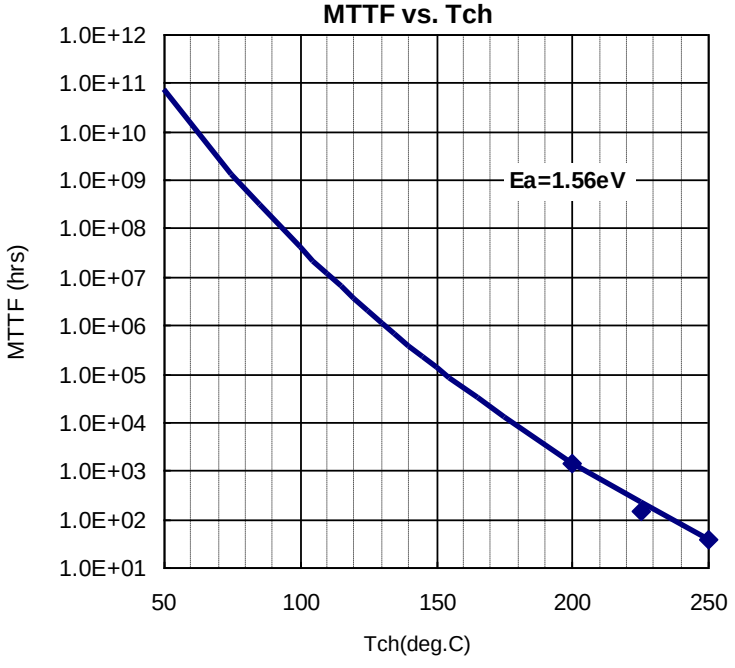


Freq. [GHz]	S11 MAG	ANG	S21 MAG	ANG	S12 MAG	ANG	S22 MAG	ANG
1	9.81E-01	-114.7	1.06E-01	99.0	2.57E-05	-67.5	9.63E-01	-118.1
2	9.36E-01	133.6	2.44E-02	-41.8	1.55E-04	141.7	9.03E-01	129.3
3	9.25E-01	27.9	1.99E-02	-159.9	1.59E-04	16.2	9.12E-01	23.8
4	9.46E-01	-76.7	7.10E-03	130.6	5.44E-04	-138.4	9.18E-01	-85.3
5	9.34E-01	175.0	1.92E-02	94.6	6.85E-04	89.0	8.65E-01	155.2
6	9.01E-01	64.9	8.04E-02	24.6	6.49E-04	-23.7	8.18E-01	35.0
7	8.73E-01	-41.5	7.91E-01	-91.6	1.89E-04	-144.5	7.86E-01	-85.4
8	8.76E-01	-144.6	5.41E+00	49.8	5.55E-04	44.7	6.97E-01	135.4
9	8.34E-01	104.6	8.86E+00	-165.2	4.35E-04	-108.9	6.19E-01	-0.5
10	7.79E-01	-11.4	9.74E+00	8.6	4.75E-04	144.2	5.15E-01	-113.0
11	7.78E-01	-127.6	1.19E+01	-168.4	9.02E-04	68.3	2.48E-01	144.7
12	7.96E-01	122.9	1.60E+01	18.6	1.09E-03	-7.6	1.05E-01	101.4
13	7.50E-01	10.6	2.52E+01	-168.8	3.30E-04	50.6	1.98E-01	-13.1
14	4.87E-01	-115.4	3.01E+01	-19.1	9.85E-04	-140.5	1.92E-01	-140.4
15	4.32E-02	114.3	2.44E+01	130.8	9.14E-04	158.9	2.37E-01	93.3
16	2.06E-01	158.3	1.36E+01	-89.2	3.07E-03	61.5	2.39E-01	-90.7
17	5.33E-01	45.5	4.90E+00	70.4	4.08E-03	-84.8	3.96E-01	139.9
18	7.43E-01	-74.0	1.40E+00	-105.0	2.23E-03	105.2	4.66E-01	37.6
19	7.84E-01	-173.4	4.91E-01	100.1	3.88E-03	-59.3	4.08E-01	-55.2
20	7.80E-01	90.1	2.41E-01	-53.3	7.40E-03	72.7	2.80E-01	-156.3
21	7.64E-01	-22.6	1.25E-01	128.3	3.09E-03	-112.8	1.72E-01	82.7
22	7.51E-01	-140.4	3.14E-02	-75.6	3.56E-03	58.1	1.15E-01	-0.2
23	7.73E-01	120.7	2.56E-03	-164.2	3.13E-03	-96.3	2.94E-01	-33.9
24	7.74E-01	33.3	1.42E-03	-99.5	9.18E-04	-60.5	5.27E-01	-121.1
25	7.65E-01	-54.2	4.92E-03	-1.9	5.07E-03	23.5	6.30E-01	152.7
26	7.51E-01	-151.6	1.82E-03	-39.2	2.74E-03	-84.4	6.16E-01	58.1
27	7.56E-01	102.0	4.18E-03	35.4	1.47E-03	123.3	6.54E-01	-53.6
28	7.20E-01	-7.7	2.04E-03	72.5	1.48E-03	88.2	7.24E-01	-163.8
29	6.33E-01	-113.9	2.69E-03	0.4	2.41E-03	1.2	7.37E-01	102.7
30	5.69E-01	147.8	4.70E-03	-41.8	1.89E-03	-53.8	7.09E-01	16.0

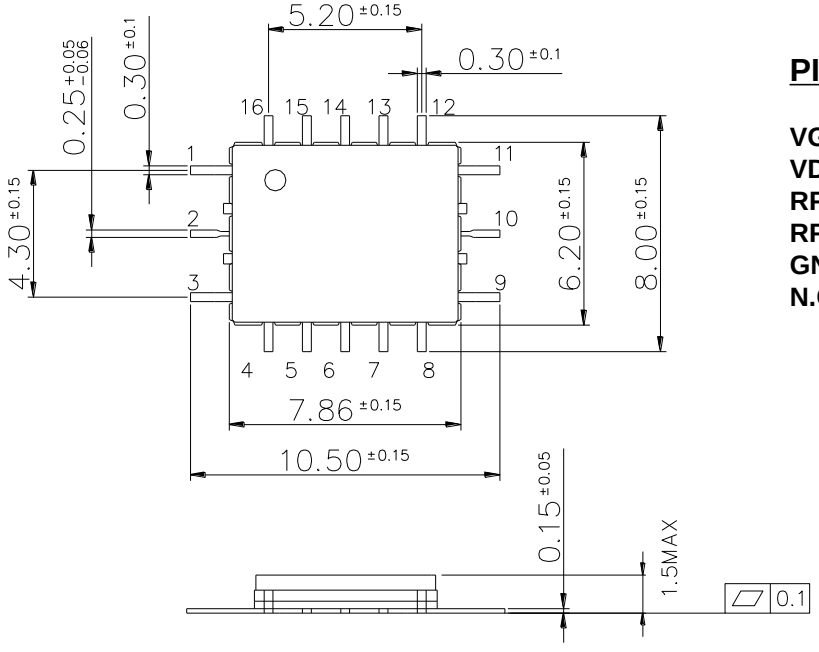
Reliability Data

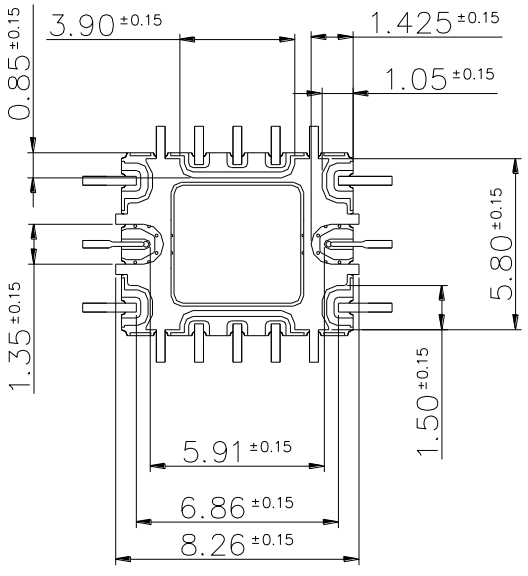


Note: ΔTch : Temperature Rise from Backside of the Package to Channel.



Package Outline and Pin Assignment



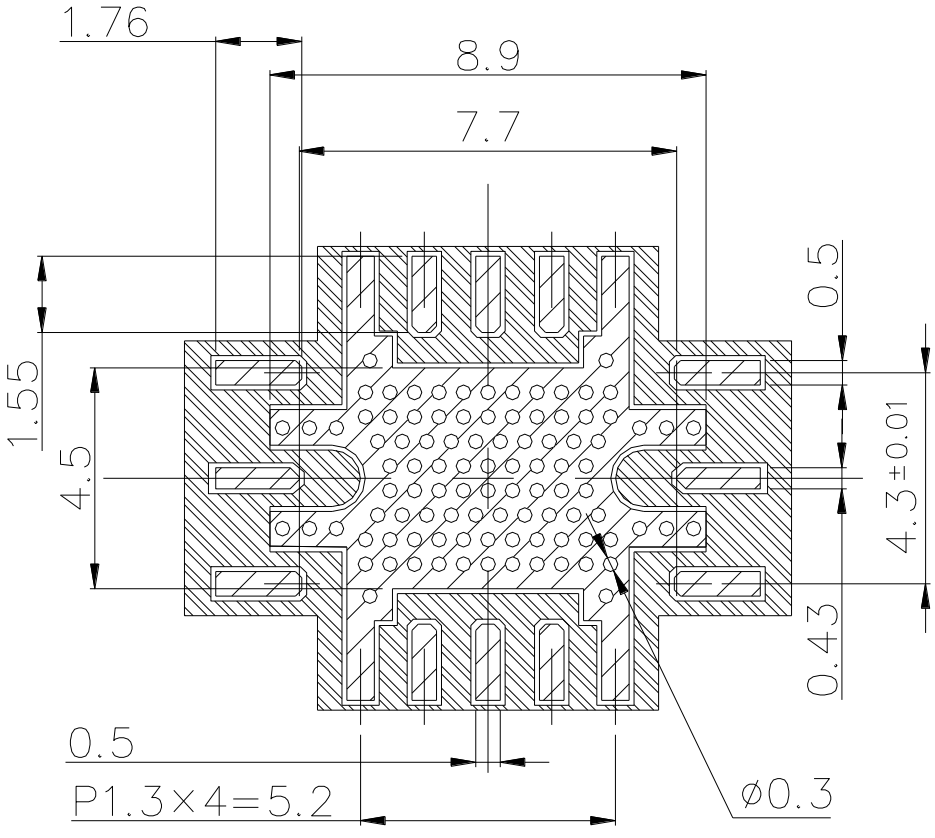


PIN Assignment

VGG : 1, 3
VDD : 5, 6, 7, 13, 14, 15
RF_{IN} : 2
RF_{OUT} : 10
GND : 4, 8, 12, 16
N.C. : 9, 11

Unit : mm

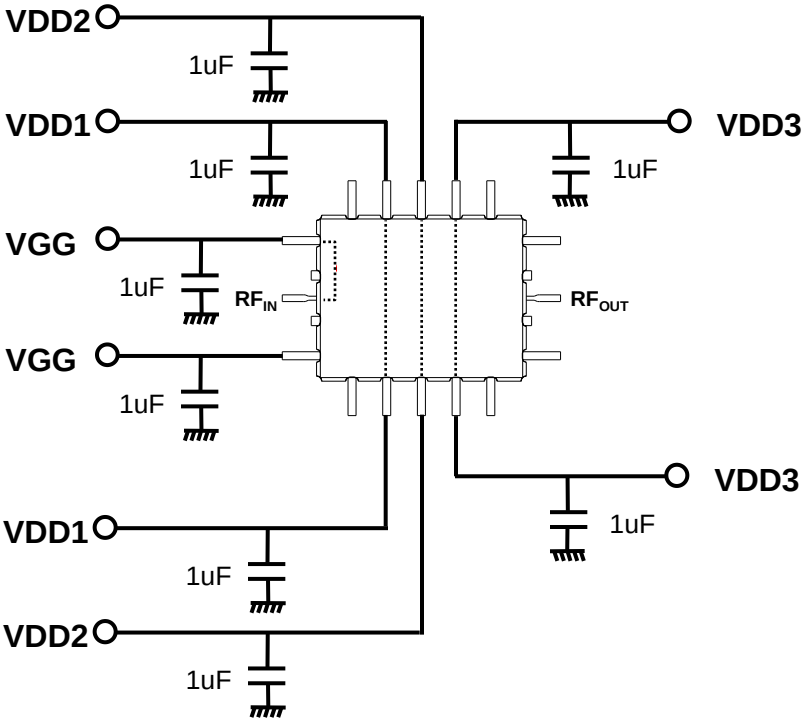
PCB Pads and Solder-resist Pattern



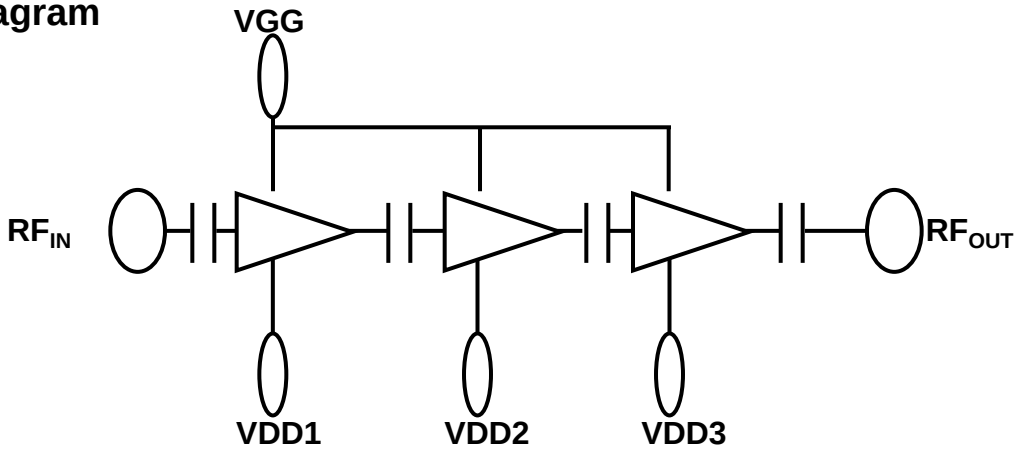
NOTES.
1).CORE MATERIAL; Rogers CORP. RO4003
THICKNESS 0.2mm typ., Er=3.38 typ.
2).COPPER FOIL THICKNESS 18um typ.
3). ; FINISH COPPER FOIL; Ni 1um min./Au 0.1um max.
4). ; RESIST.

Unit : mm

Recommended Bias Network



Block Diagram

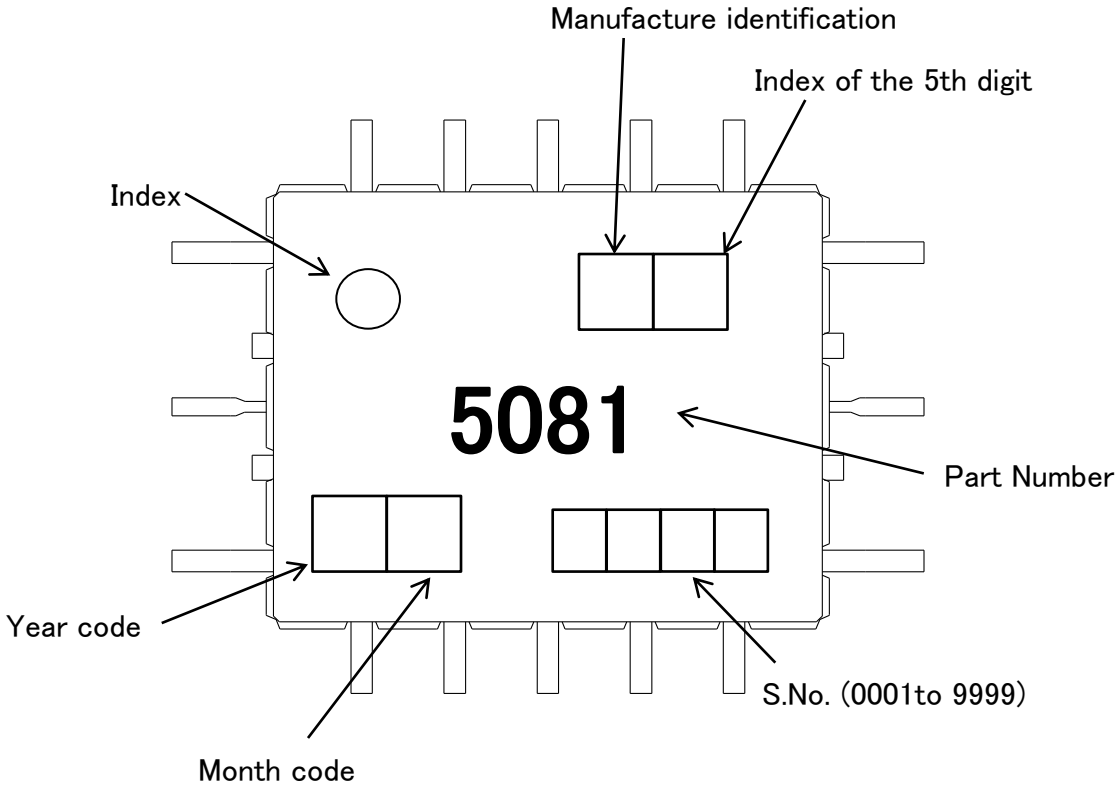


Note

1) The capacitors are recommended on the bias supply line, close to the package, in order to prevent video oscillations which could damage the module.

2) The same named VDD pins are internally connected.

Marking Information



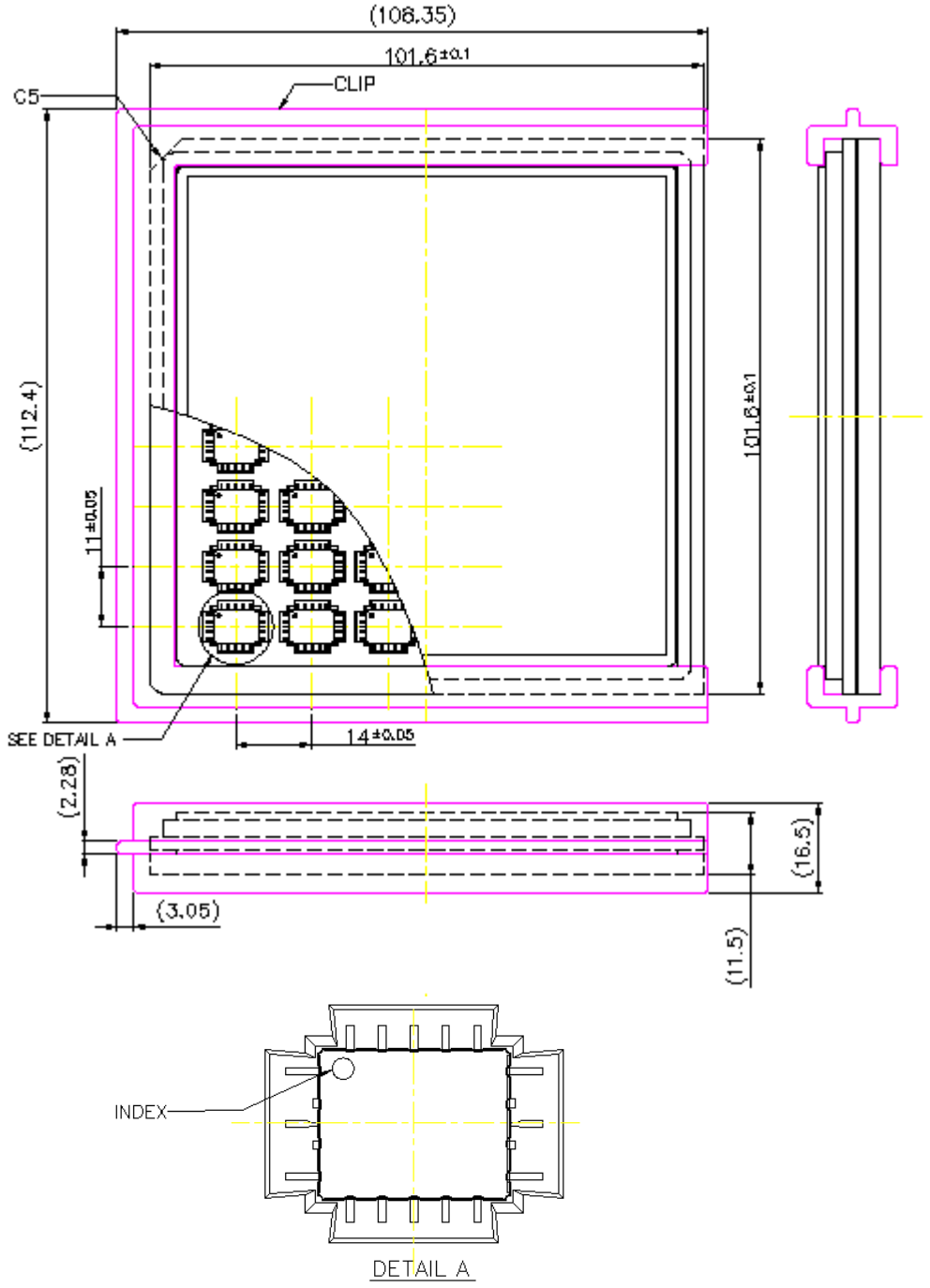
<Year code>

Code	T	U	V	W	X	Y	Z	A	B
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019

<Month code>

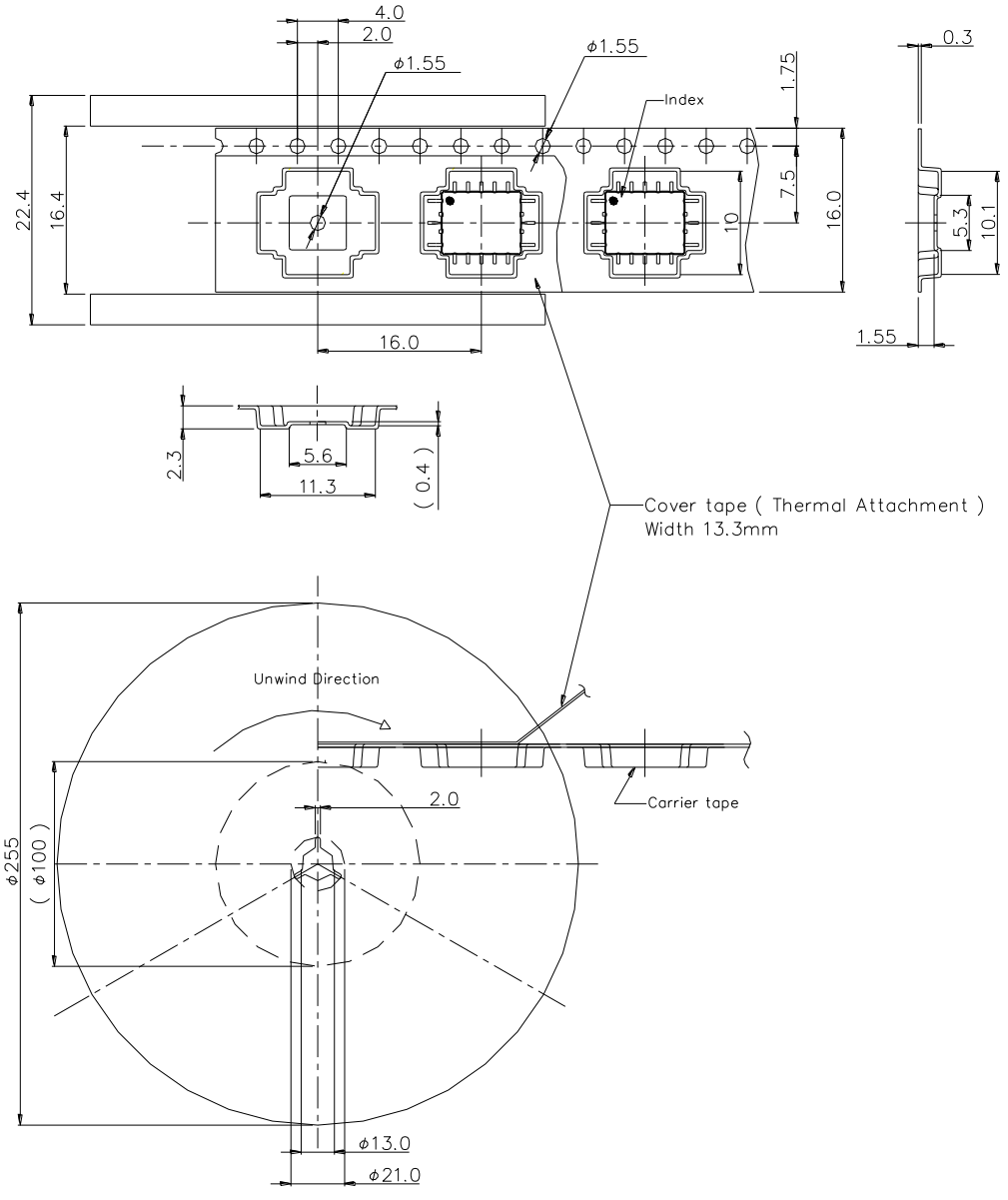
Code	H	M	N	P	R	S	T	U	W	X	Y	Z
Month	1	2	3	4	5	6	7	8	9	10	11	12

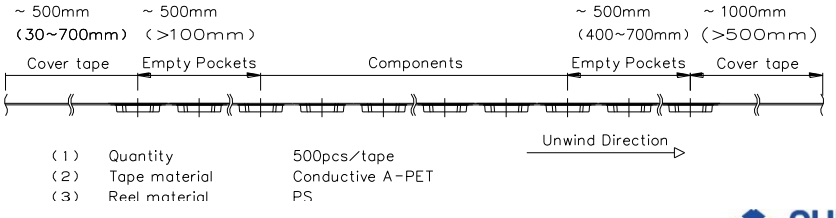
4-inch Tray Packing (Part No. : EMM5081V1B)



(1) Maximum Quantity : 48pcs. / Tray
(2) Tray Material : Conductive PS

Tape and Reel Packing (Part No. : EMM5081V1BT)





(1)	Quantity	500pcs/tape
(2)	Tape material	Conductive A-PET
(3)	Reel material	PS

Mounting Method of SMD(Surface Mount Devices) for Lead-free solder

Mounting Condition

(1) For soldering, Lead-free solder (Sn-3.0Ag-0.5Cu)*1 or equivalent shall be used.

(*1: The figure displays with weight %. A predominantly tin-rich alloy with 3.0% silver and 0.5% copper.)

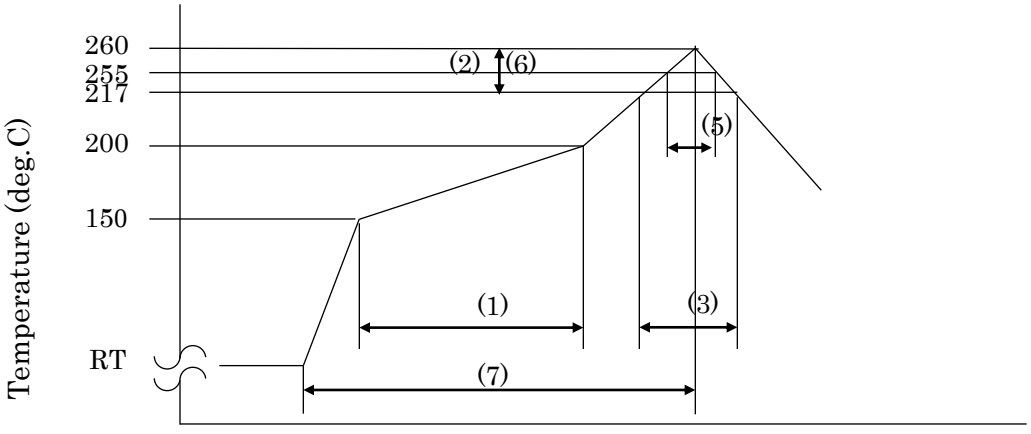
(2) A rosin type flux with a chlorine content of 0.2% or less shall be used. The rosin flux with low halogen content is recommended.

(3) When soldering, use one of the following time / temperature methods for acceptable solder joints. Make sure the devices have been properly prepared with flux prior soldering.

*** Reflow soldering method (Infrared reflow / Heat circulation reflow / Hot plate reflow):**

Limit solder to 3 reflow cycles because resin is used in the modules manufacturing process. Excessive reflow cycles will effect the resin resulting in a potential failure or latent defect. The recommended reflow temperature profile is shown below. The temperature of the reflow profile must be measured at the device body surface.

Reflow temperature profile and condition:



(1) Preheating:	150 to 200 deg.C, 60 to 120 seconds
(2) Ramp-up Rate:	3 deg.C /seconds max
(3) Liquidous temperature and time:	217 deg.C, 60 to 150 seconds
(4) Peak Temperature:	260 deg.C
(5) Time Peak Temperature within 5 deg.C:	< 30seconds
(6) Ramp-down Rate:	6 deg.C /seconds max
(7) Time RT to peak temperature:	8 minutes max

* Measurement point: Center of the package body surface

(4) The above-recommended conditions were confirmed using the manufacture's equipment and materials. However, when soldering these products, the soldering condition should be verified by customer using their equipment and materials.

For further information please contact:

http://global-sei.com/Electro-optic/about/office.html

CAUTION

This product contain **gallium arsenide (GaAs)** which can be hazardous to the human body and the environment. For safety, observe the following procedures:

・Do not put these products into the mouth.

・Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.

・Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.