

# EMM5841V1B

## Ka-Band Power Amplifier MMIC

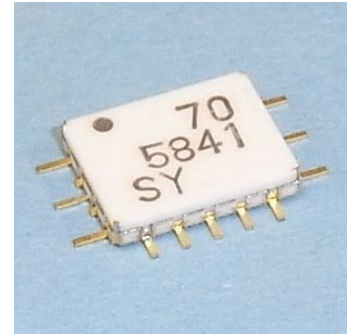
### FEATURES

- High Output Power: Pout=30.0dBm (typ.)
- Linear Gain: GL=15.0dB (typ.)
- Frequency Band: 29.5 to 30.0GHz
- Impedance Matched Zin/Zout=50ohm
- Small Hermetic Metal-Ceramic SMT Package(V1B)

### DESCRIPTION

The EMM5841V1B is a MMIC amplifier that contains a three-stages amplifier, internally matched, for standard communications band in the 29.5 to 30.0GHz frequency range. This product is well suited for Ka-band VSAT applications.

SEDI's stringent Quality Assurance Program assures the highest reliability and consistent performance.



### ABSOLUTE MAXIMUM RATING

Item	Symbol	Rating	Unit
DC Positive Supply Voltage	$V_{DD}$	10	V
DC Negative Supply Voltage	$V_{GG}$	-3	V
Input Power	$P_{in}$	+24	dBm
Storage Temperature	$T_{sta}$	-55 to +125	degC

### RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Recommend	Unit
DC Positive Supply Voltage	$V_{DD}$	up to 6	V
Input Power	$P_{in}$	up to +18	dBm
Operating Case Temperature	$T_C$	-40 to +85	degC

### ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25degC)

Item	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
RF Frequency Range	f	$V_{DD}=6.0V$	29.5	-	30.0	GHz
Gate Bias Voltage	$V_{GG}$	$I_{DD}=750mA$ typ.	-0.50	-0.1	-0.01	V
Output Power	$P_{OUT}$	$P_{IN}=17dBm$	28.0	30.0	-	dBm
Output Power at 1dB G.C.P.	$P_{1dB}$	Vgg-constant	-	30.0	-	dBm
Power Gain at 1dB G.C.P.	$G_{1dB}$	$Z_S=Z_L=50ohm$	11.0	14.0	-	dB
Power-added Efficiency at 1dB G.C.P.	$\eta_{add}$		-	18	-	%
Drain Current at 1dB G.C.P.	$I_{DDRF}$		-	910	1200	mA
Input Return Loss (at Pin=0dBm)	$RL_{IN}$		-	-10	-	dB
Output Return Loss (at Pin=0dBm)	$RL_{OUT}$		-	-10	-	dB

G.C.P Gain Compression Point

<b>ESD</b>	<b>Class 0</b>	<b>up to 250V</b>
------------	----------------	-------------------

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

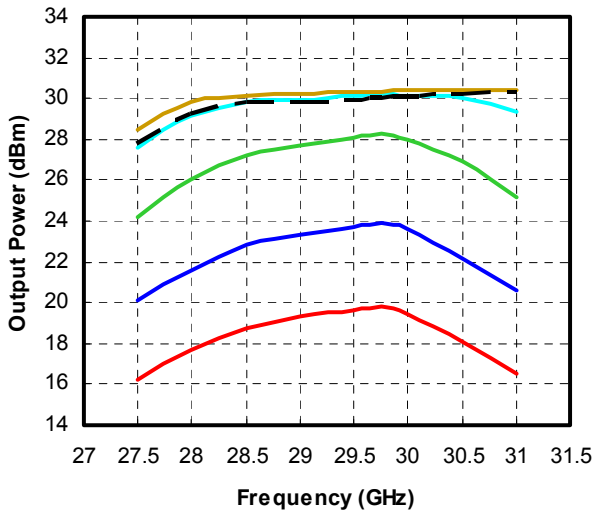
<b>CASE STYLE</b>	<b>V1B</b>
<b>RoHS Compliance</b>	<b>Yes</b>

### Ordering Information

Part Number	Order Unit	Packing
EMM5841V1B	No Limitation	48 pcs. / Tray X 4 Trays = 192 pcs. / Packing
EMM5841V1BT	500 pcs.	500 pcs. / Reel X 1 Reel = 500 pcs. / Packing

### Output Power vs. Frequency

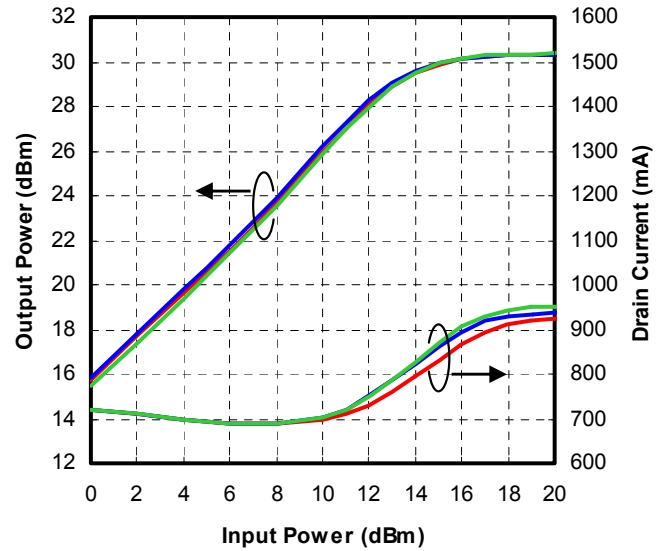
VDD=6V, IDD(DC)=750mA



— Pin=4dBm — 8dBm — 12dBm  
 — 16dBm — 20dBm — P1dB

### Output Power, Drain Current vs. Input Power

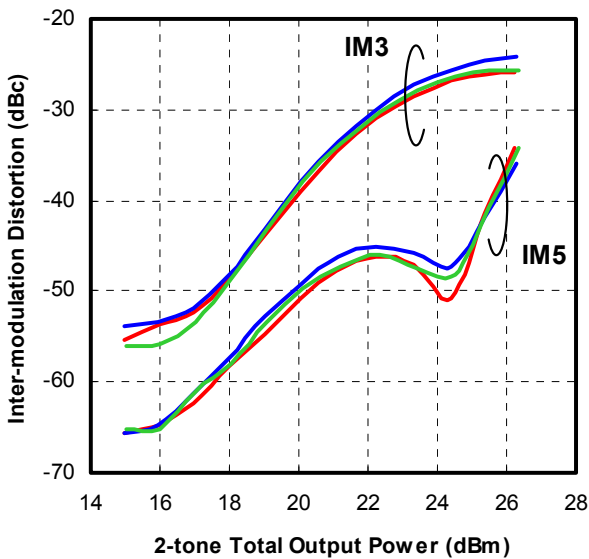
VDD=6V, IDD(DC)=750mA



— 29.5GHz — 29.75GHz — 30.0GHz

### IMD Performance vs. Output Power

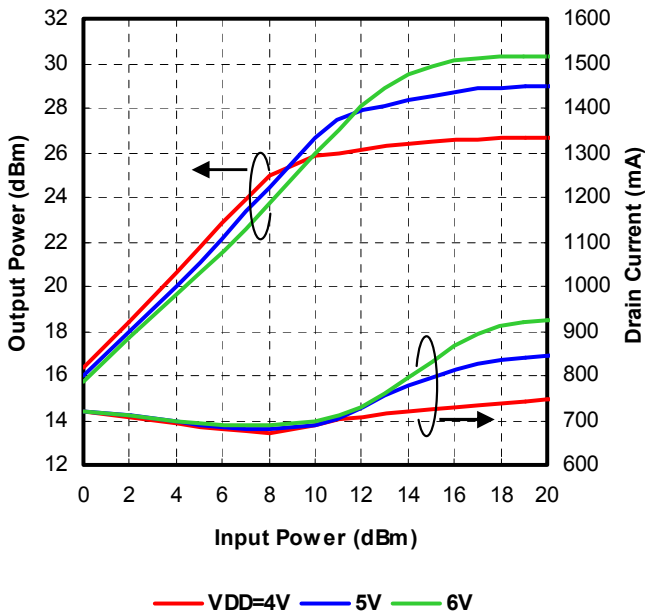
VDD=6V, IDD(DC)=750mA



— 29.5GHz — 29.75GHz — 30GHz

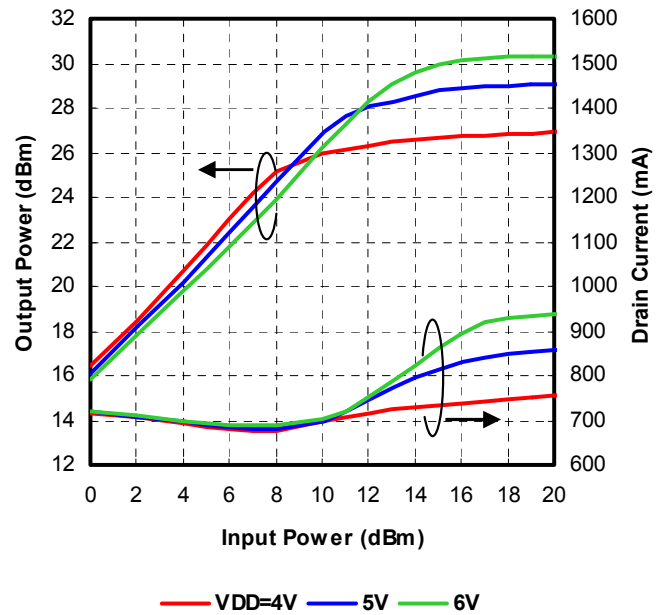
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=750mA, Freq=29.5GHz



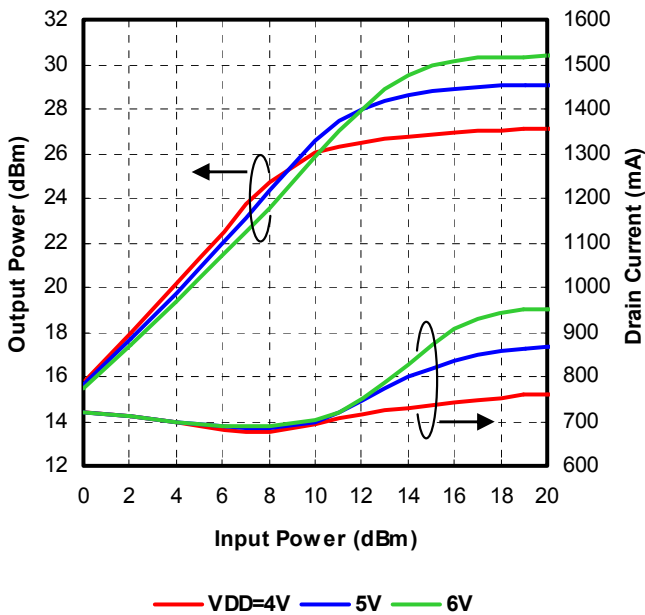
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=750mA, Freq=29.75GHz



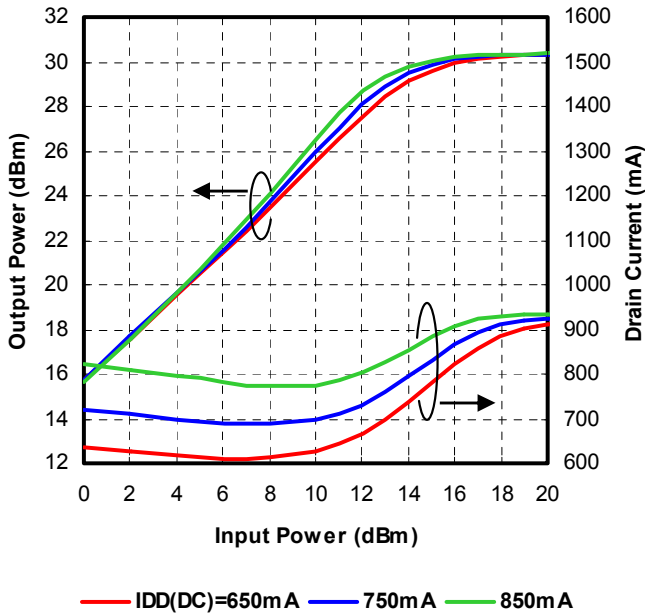
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=750mA, Freq=30.0GHz



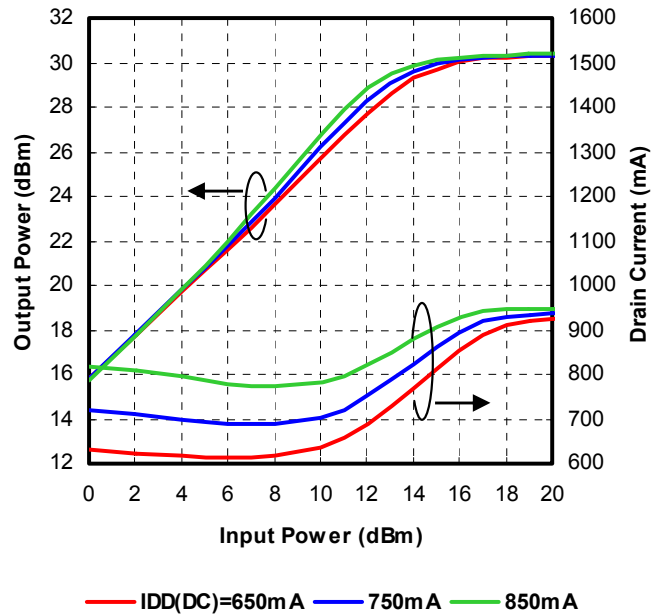
Output Power, Drain Current vs. Input Power by Drain Current

@IDD(DC)=750mA, Freq=29.5GHz



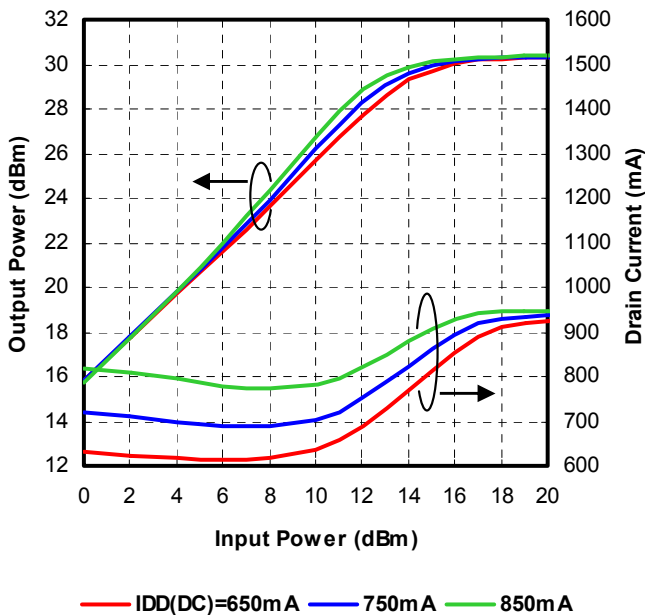
Output Power, Drain Current vs. Input Power by Drain Current

@IDD(DC)=750mA, Freq=29.75GHz



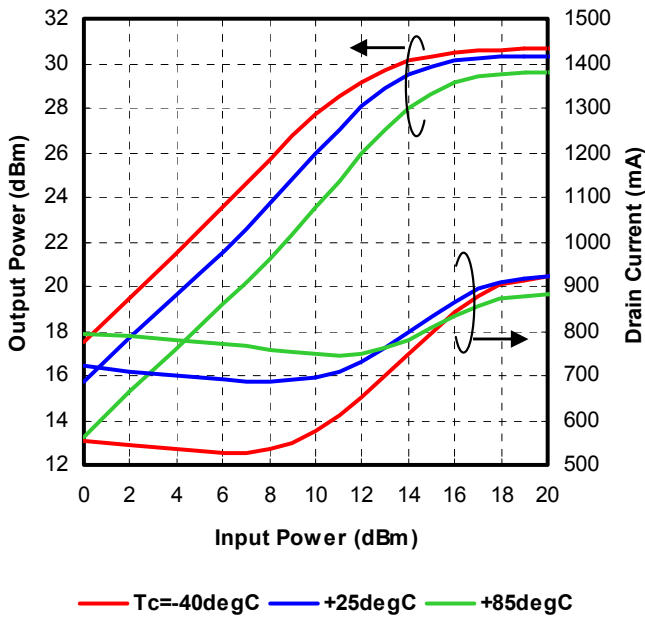
Output Power, Drain Current vs. Input Power by Drain Current

@IDD(DC)=750mA, Freq=30.0GHz



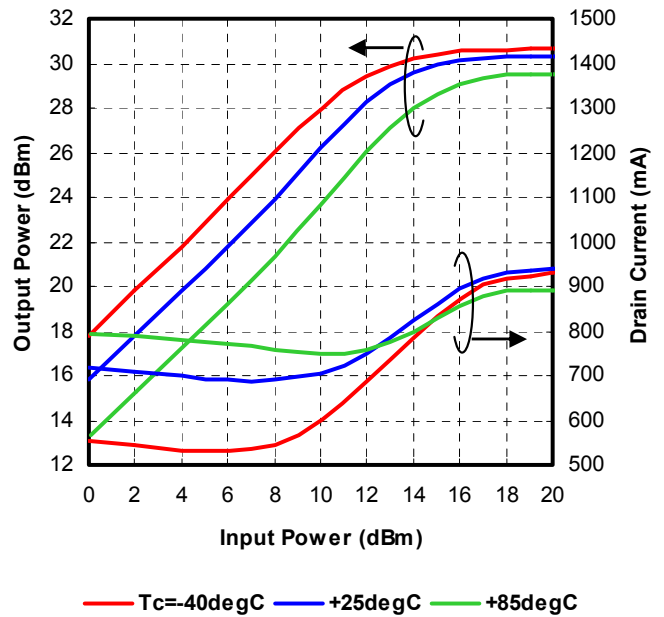
**Output Power, Drain Current vs. Input Power by Case Temperature**

@VDD=6V, IDD=750mA(@Tc=+25deg-C), Freq=29.5GHz



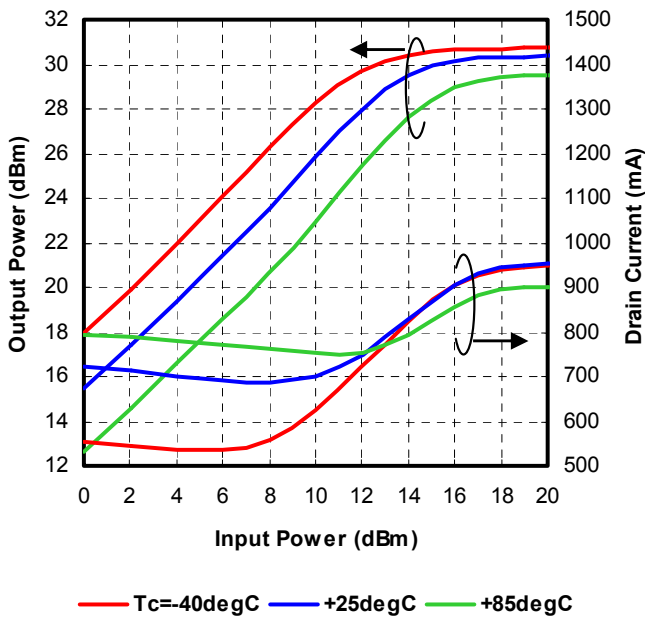
**Output Power, Drain Current vs. Input Power by Case Temperature**

@VDD=6V, IDD=750mA(@Tc=+25deg-C), Freq=29.75GHz



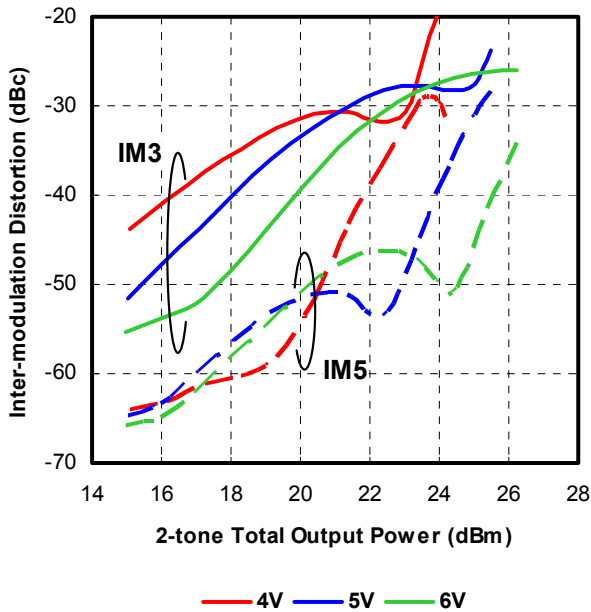
**Output Power, Drain Current vs. Input Power by Case Temperature**

@VDD=6V, IDD=750mA(@Tc=+25deg-C), Freq=30.0GHz



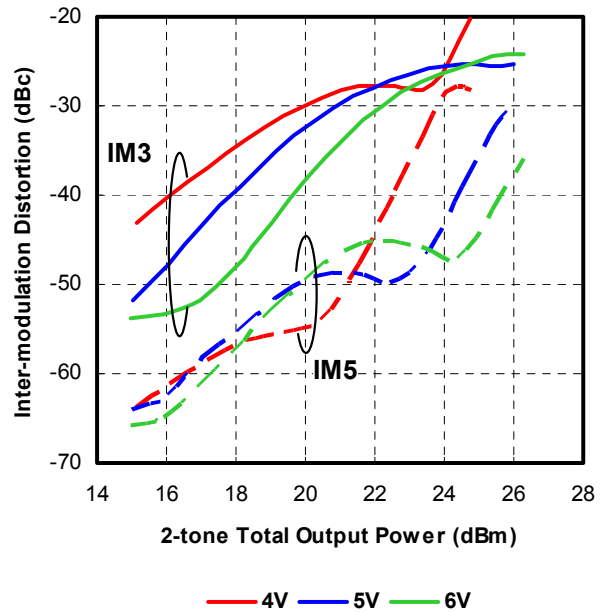
Inter-modulation Distortion vs. Output Power by Drain Voltage

@IDD(DC)=750mA, Freq=29.5GHz



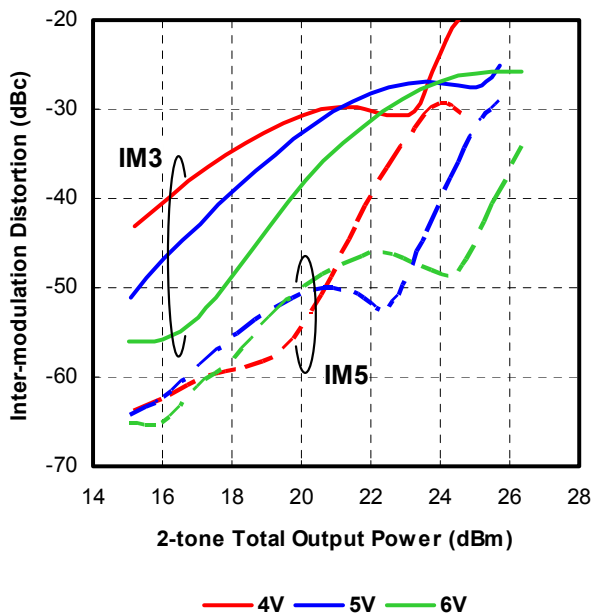
Inter-modulation Distortion vs. Output Power by Drain Voltage

@IDD(DC)=750mA, Freq=29.75GHz



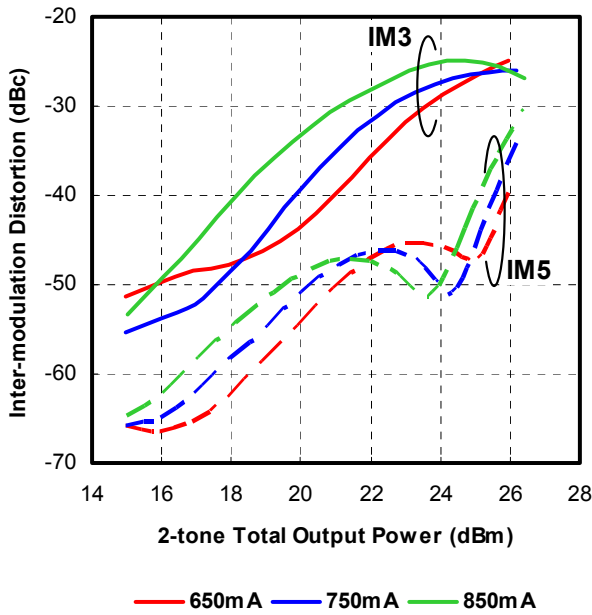
Inter-modulation Distortion vs. Output Power by Drain Voltage

@IDD(DC)=750mA, Freq=30.0GHz



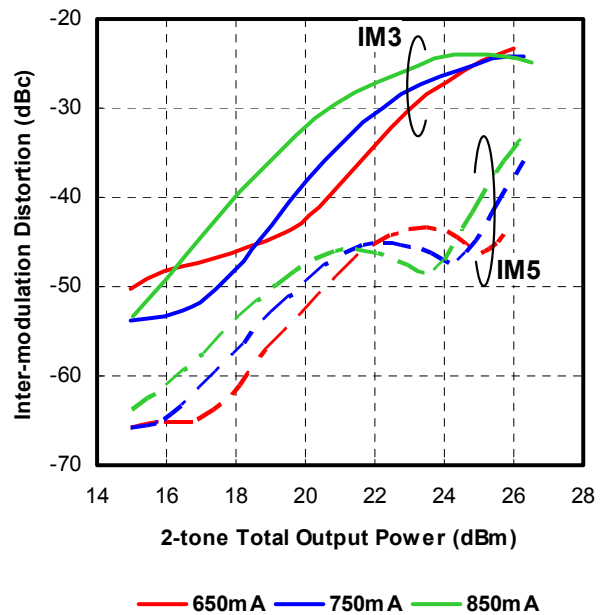
Inter-modulation Distortion vs. Output Power by Drain Current

@IDD(DC)=750mA, Freq=29.5GHz



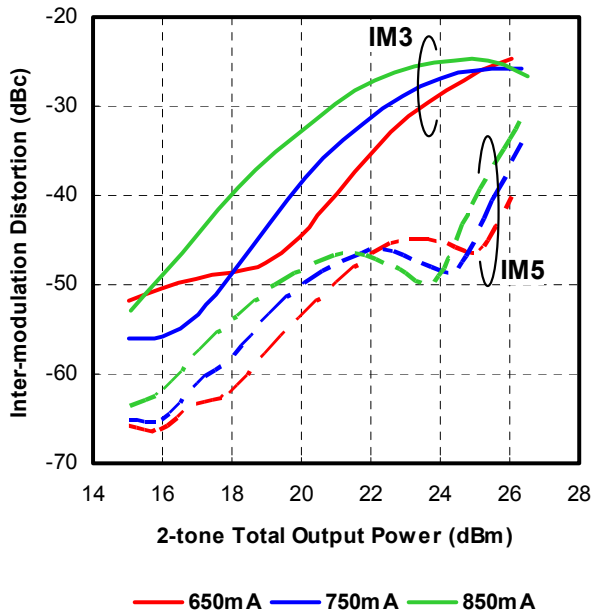
Inter-modulation Distortion vs. Output Power by Drain Current

@IDD(DC)=750mA, Freq=29.75GHz



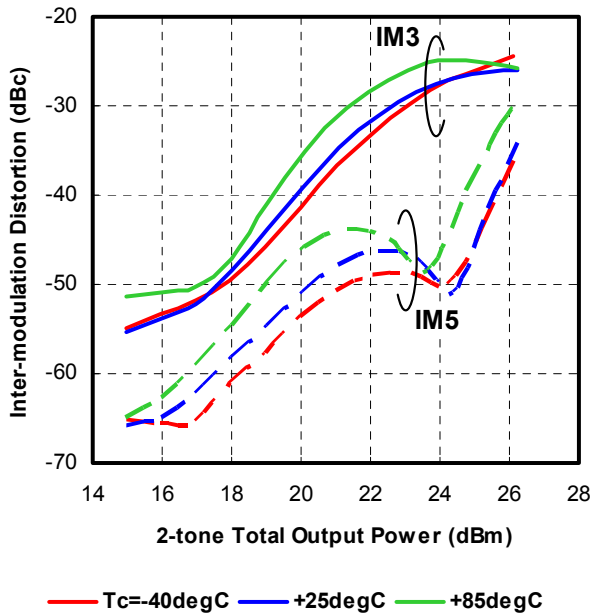
Inter-modulation Distortion vs. Output Power by Drain Current

@IDD(DC)=750mA, Freq=30.0GHz



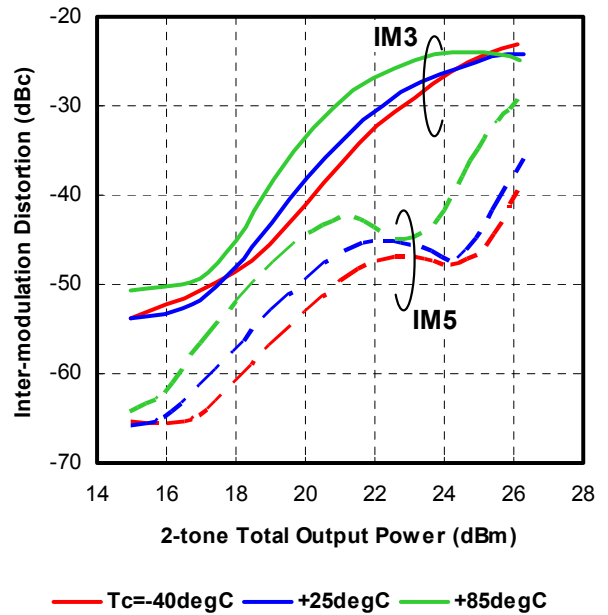
**Inter-modulation Distortion vs. Output Power by Case Temperature**

@VDD=6V, IDD=750mA(@Tc=+25deg-C), Freq=29.5GHz



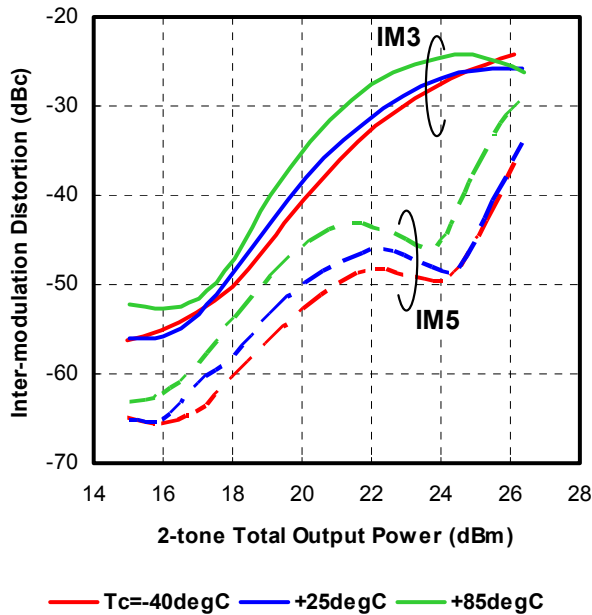
**Inter-modulation Distortion vs. Output Power by Case Temperature**

@VDD=6V, IDD=750mA(@Tc=+25deg-C), Freq=29.75GHz



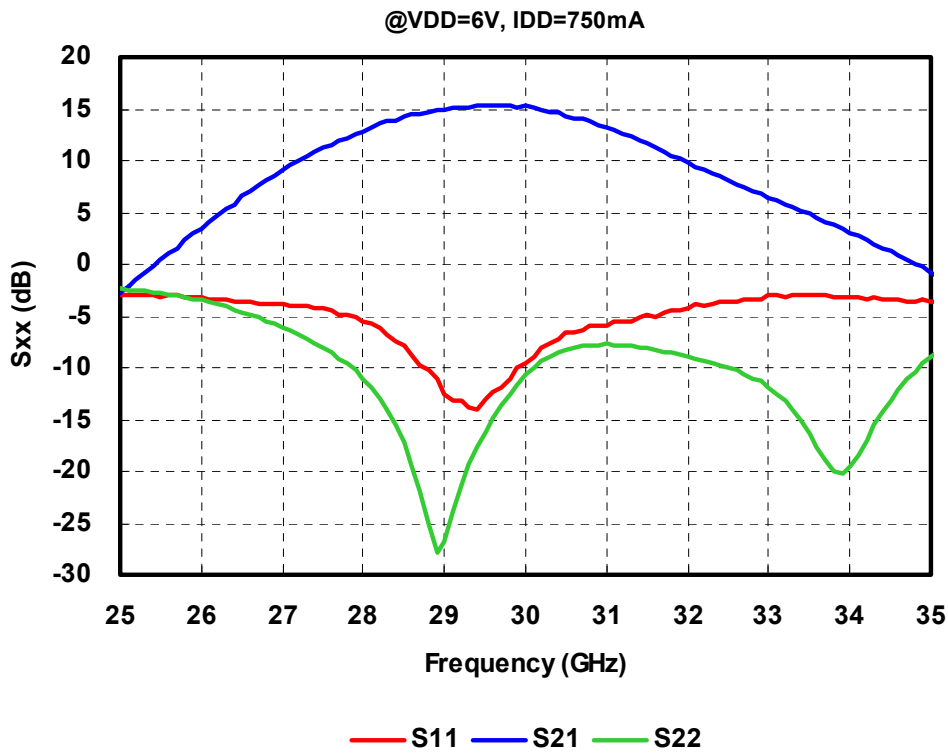
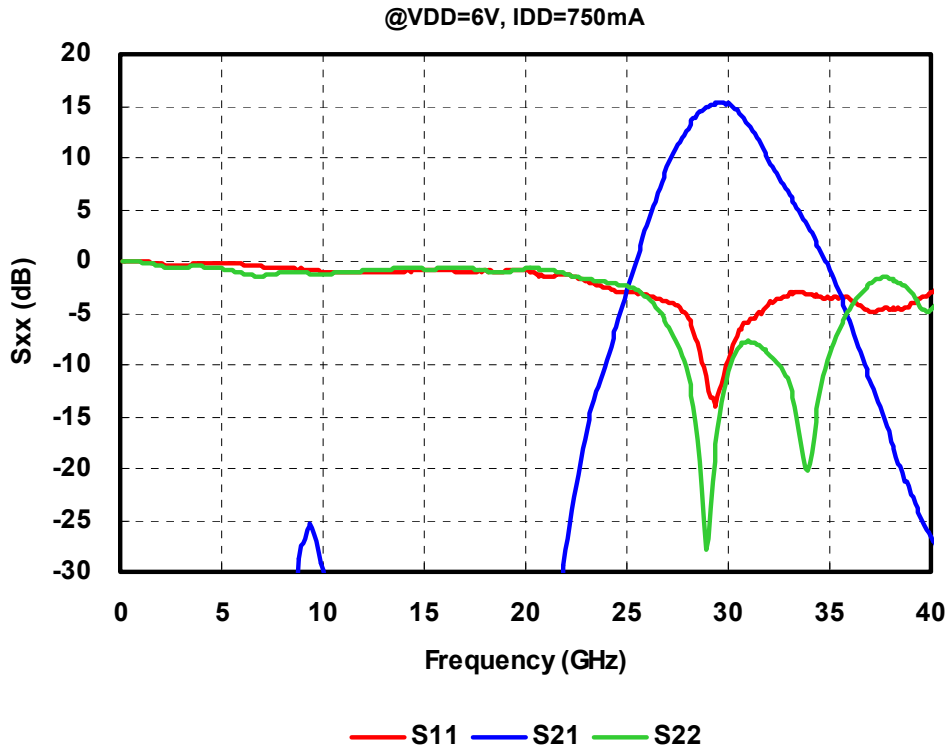
**Inter-modulation Distortion vs. Output Power by Case Temperature**

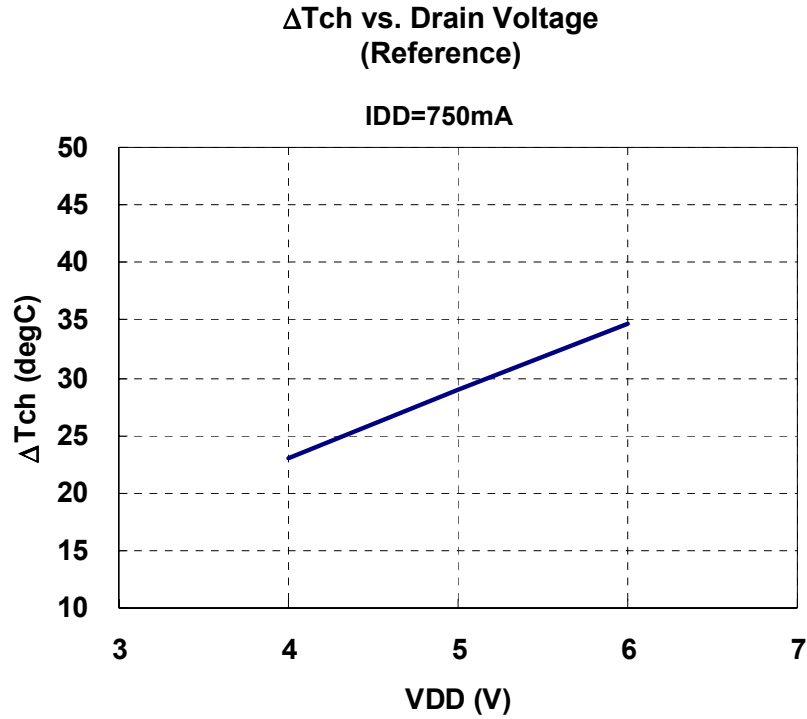
@VDD=6V, IDD=750mA(@Tc=+25deg-C), Freq=30.0GHz



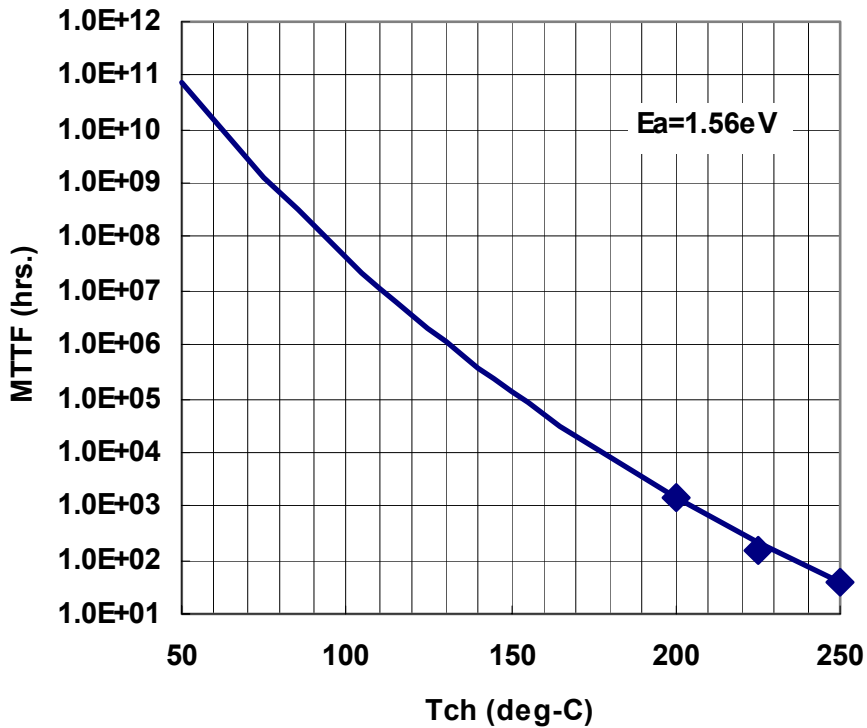


■ S-PARAMETERS

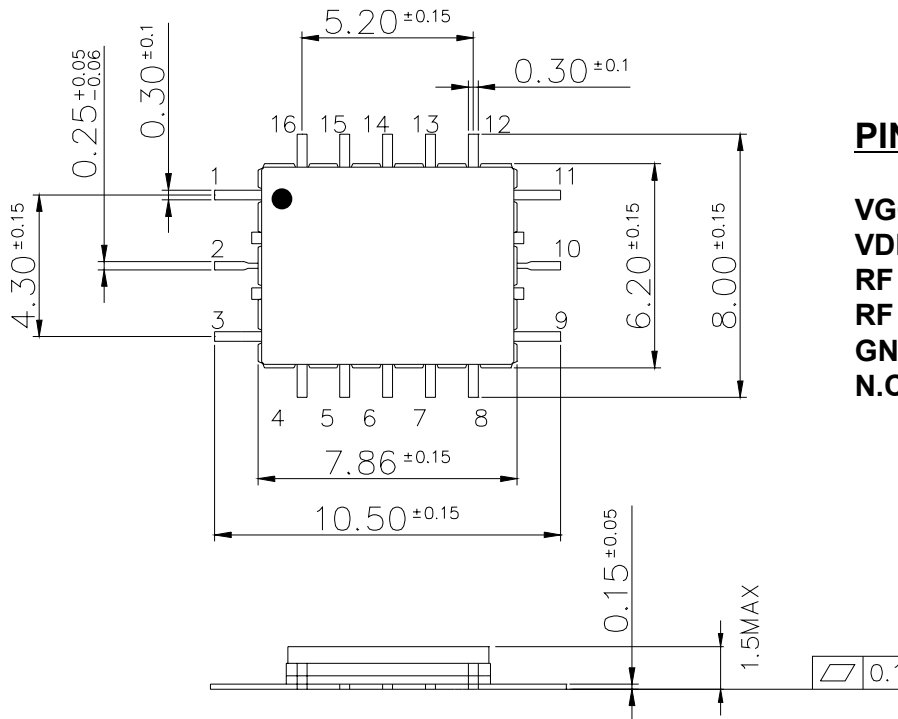




Note: ΔTch : Temperature Rise from Backside of the Package to Channel.

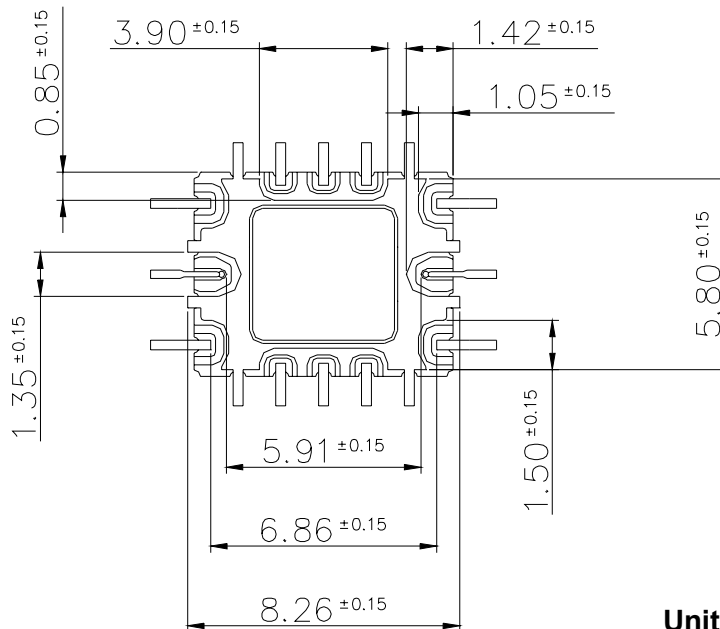


### Package Outline and Pin Assignment



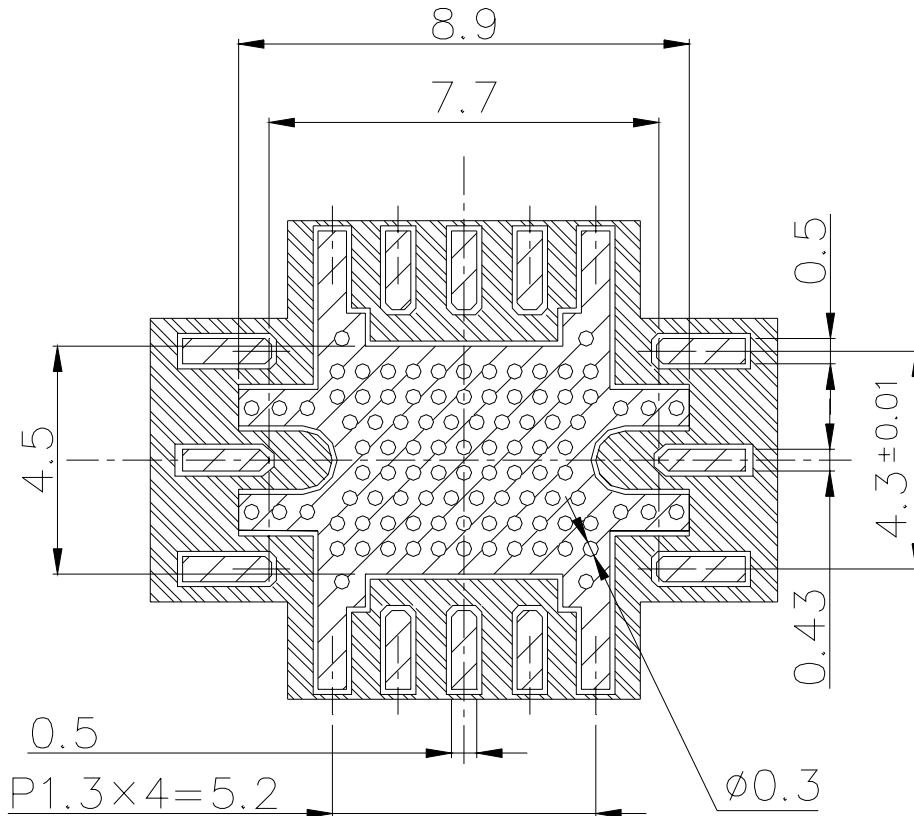
### PIN Assignment

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

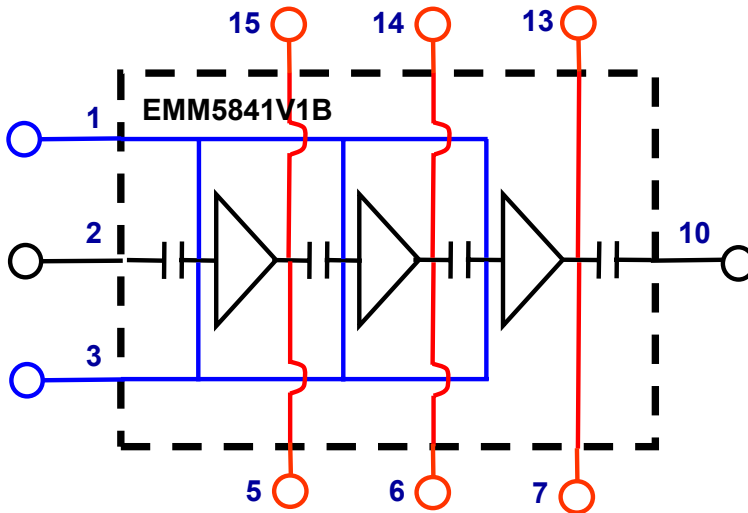


#### NOTES.

- 1).CORE MATERIAL; Rogers CORP. R04003  
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

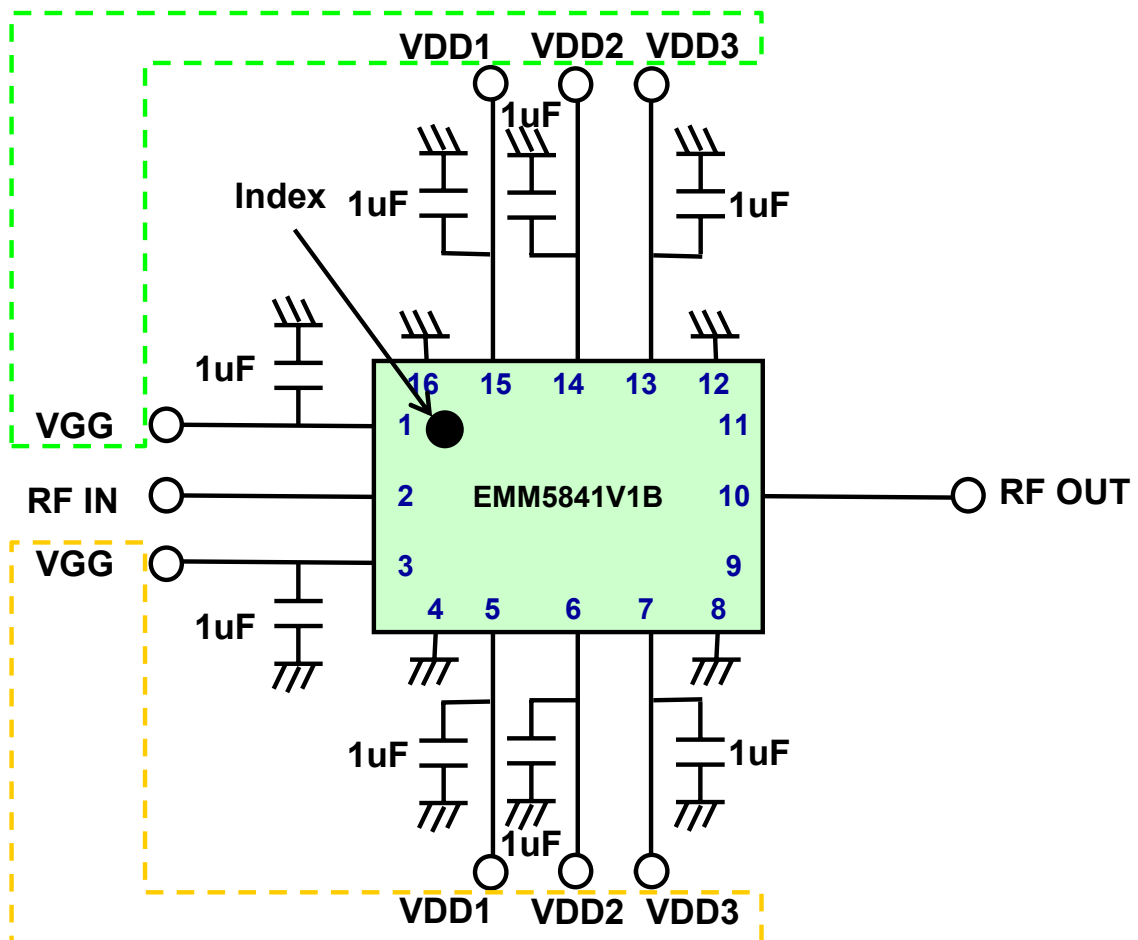
### Block Diagram



### PIN Assignment

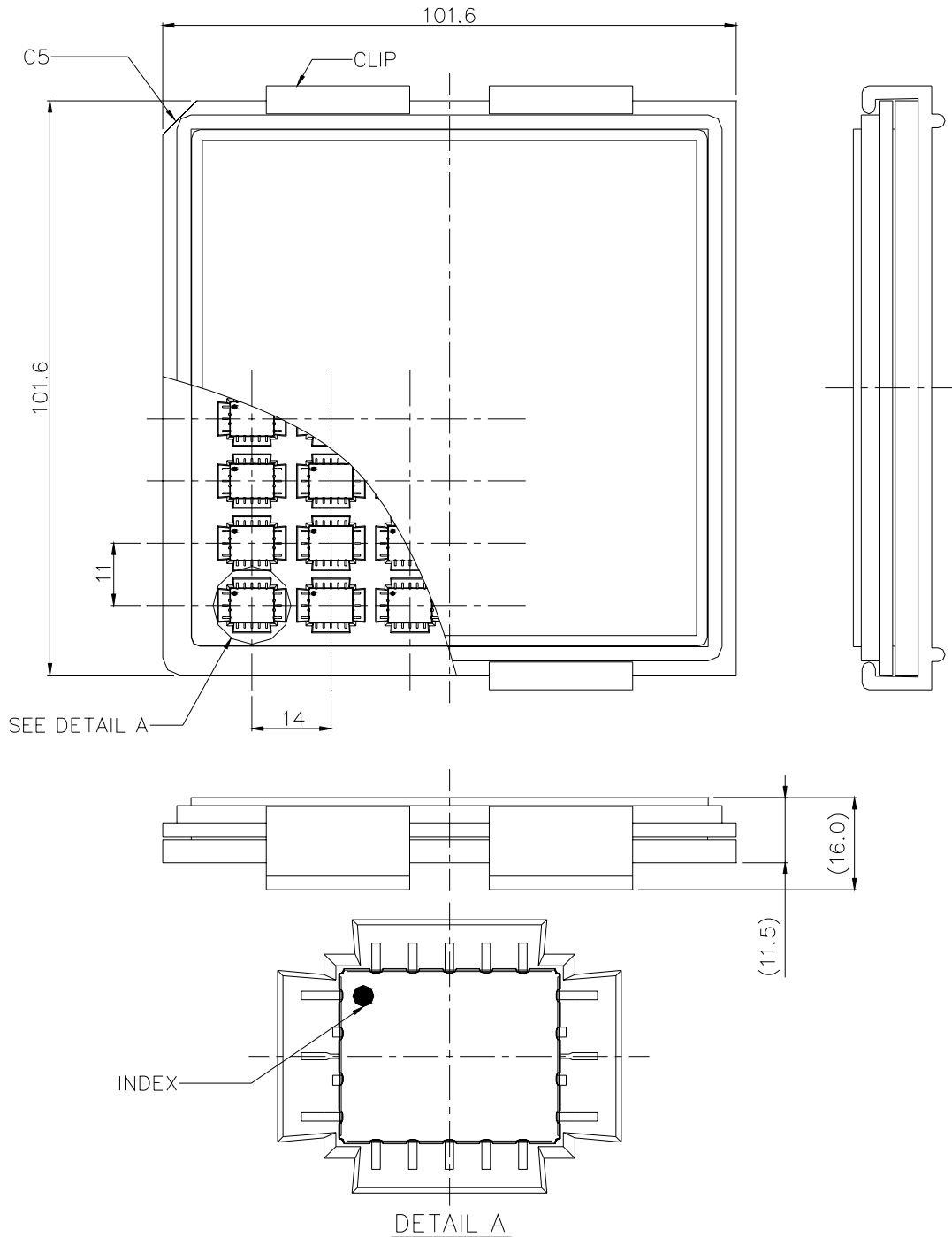
- VGG : 1, 3
- VDD : 5, 6, 7, 13, 14, 15
- RF IN : 2
- RF OUT : 10
- GND : 4, 8, 12, 16
- N.C. : 9, 11

### Recommended Bias Network



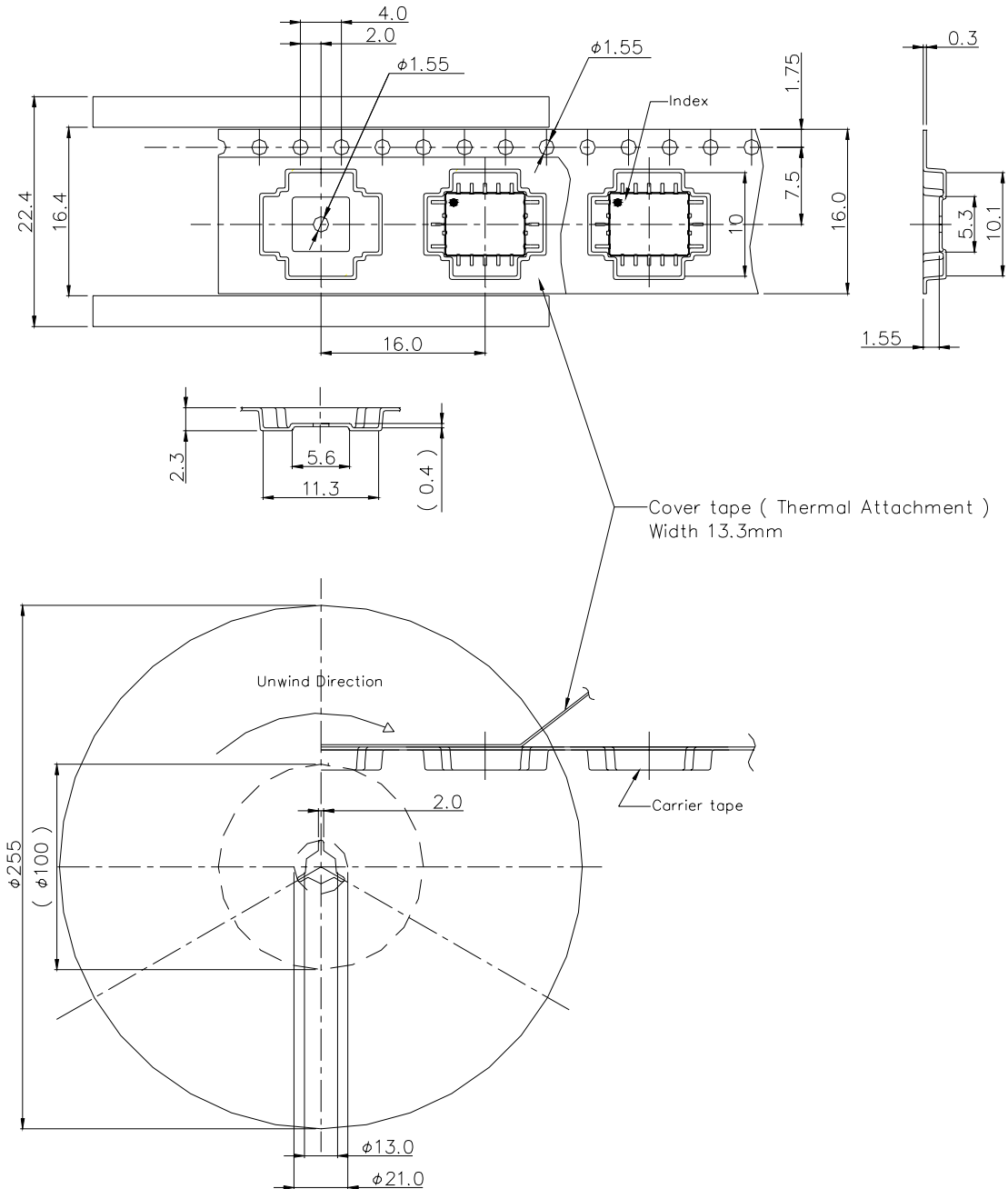
NOTE: All the VDD and VGG may be biased from one direction (upper or lower) at least.

■4-inch Tray Packing (Part No. : EMM5841V1B)



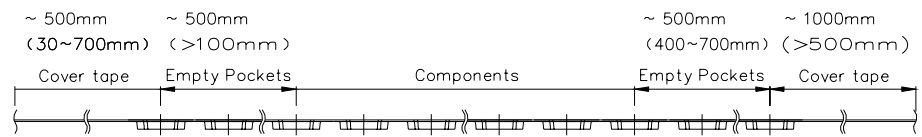
- (1) Maximum Quantity : 48 pcs./Tray
- (2) Tray Material : Conductive PS

### ■Tape and Reel Packing (Part No. : EMM5841V1BT)



Cover tape ( Thermal Attachment )  
Width 13.3mm

Carrier tape



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

Unwind Direction →

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

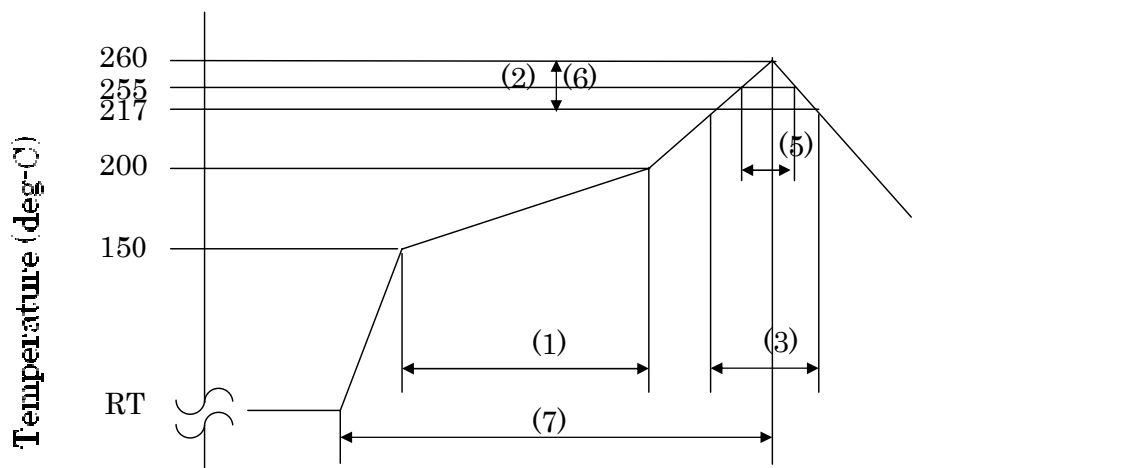
#### Mounting Condition

- (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: | under 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.





# **EMM5841V1B**

***Ka-Band Power Amplifier MMIC***

**For further information please contact:**

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

## **CAUTION**

This product contains **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.