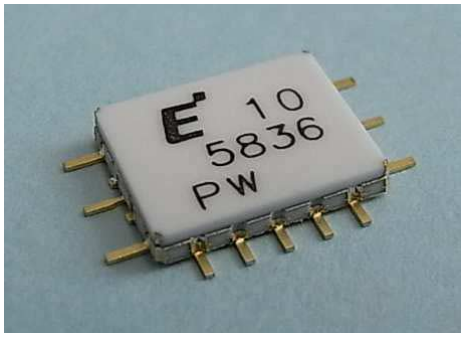
EMM5836V1B

K-Band Power Amplifier MMIC

FEATURES

- High Output Power: Pout=33.5dBm (typ.)
- High Linear Gain: GL=27.0dB (typ.)
- Broad Band: 17.7～19.7GHz
- Impedance Matched Zin/Zout=50Ω
- Small Hermetic Metal-Ceramic SMT Package(V1B)



DESCRIPTION

The EMM5836V1B is a MMIC amplifier that contains a four-stage amplifier, internally matched, for standard communications band in the 17.7 to 19.7GHz frequency range.
SEDI's stringent Quality Assurance Program assures the highest reliability and consistent performance.

ABSOLUTE MAXIMUM RATING

Item	Symbol	Rating	Unit
Drain-Source Voltage	V_{DD}	10	V
Gate-Source Voltage	V_{GG}	-3	V
Input Power	P_{in}	23	dBm
Storage Temperature	T_{stg}	-55 to +125	degC

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Condition	Unit
Drain-Source Voltage	V_{DD}	=< 6	V
Input Power	P_{in}	=<14	dBm
Operating Case Temperature	T_C	-40 to +85	degC

ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25℃)

Item	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Frequency Range	f	VDD=6.0V	17.7	-	19.7	GHz
Gate Bias Voltage	Vgg(DC)	IDD(DC)=1400mA typ.	-0.50	-0.15	-0.01	V
Output Power at 1dB G.C.P.	P1dB	Vgg-Const.	31.5	33.5	-	dBm
Power Gain at 1dB G.C.P.	G1dB	Zs=Zl=50ohm	22	26	-	dB
Power-added Efficiency at 1dB G.C.P.	Nadd	* : df=+10MHz	-	20	-	%
Third Order Intermodulation Distortion *	IM3	Pout=20.0dBm	-37	-40	-	dBc
Drain Current at 1dB G.C.P.	Iddrf	(S.C.L)	-	1800	2200	mA
Input Return Loss at Pin=-20dBm	RLin		-	12	-	dB
Output Return Loss at Pin=-20dBm	RLout		-	8	-	dB

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

ESD	Class 0	=< 250V

Note : Based on JEDEC JESD22-A114C (C=100pF, R=1.5kohm)

CASE STYLE	V1B

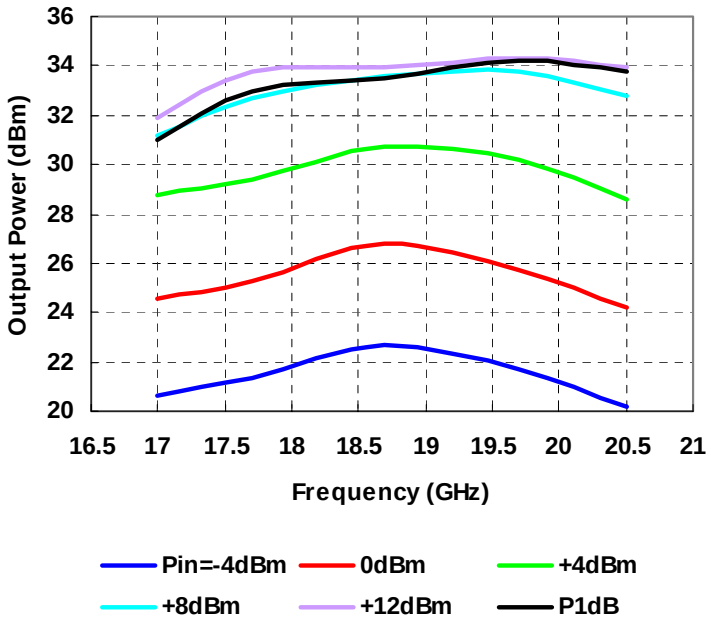
RoHS COMPLIANCE	YES

ORDERING INFORMATION

Part Number	Order Unit	Packing
EMM5836V1B	No Limitation	48 pcs./Tray × 4 Tray = 192 pcs./Packing
EMM5836V1BT	500pcs.	500 pcs./Reel × 1 Reel = 500 pcs./Packing

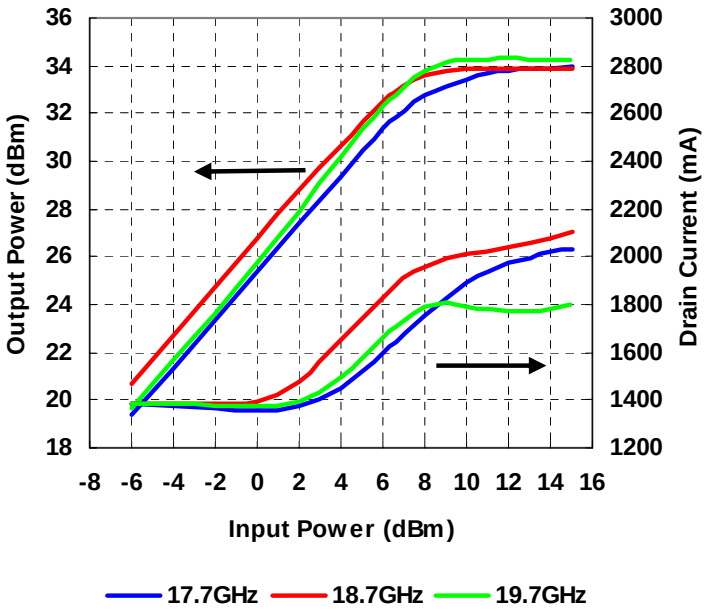
Output Power vs. Frequency

@VDD=6V, IDD(DC)=1400mA



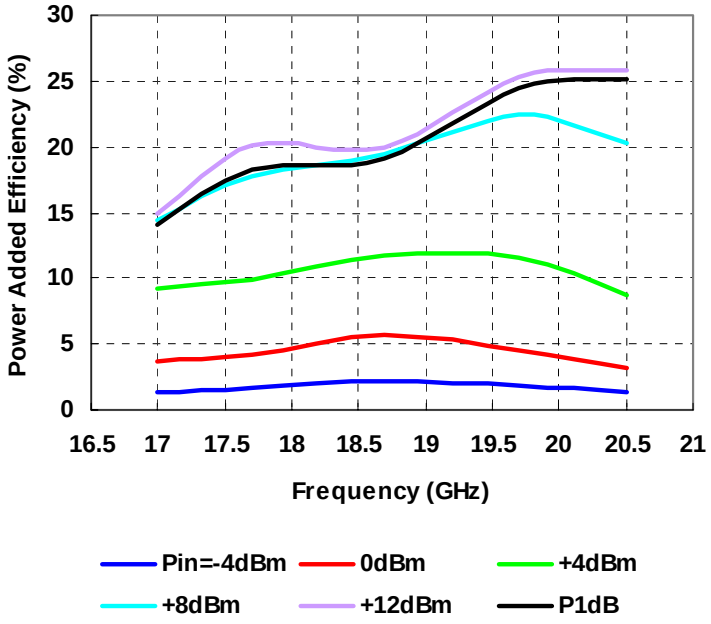
Output Power, Drain Current vs. Input Power

@VDD=6V, IDD(DC)=1400mA



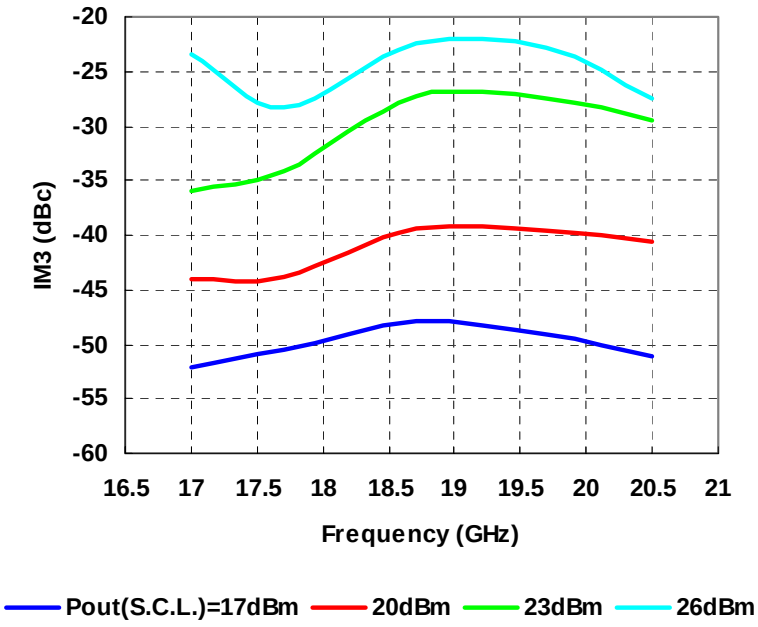
Power Added Efficiency vs. Frequency

@VDD=6V, IDD(DC)=1400mA



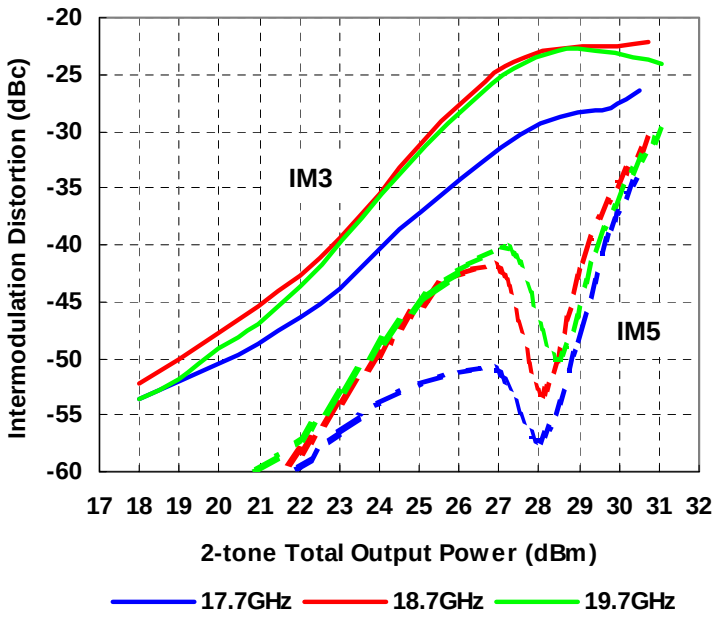
IM3 vs. Frequency

@VDD=6V, IDD(DC)=1400mA



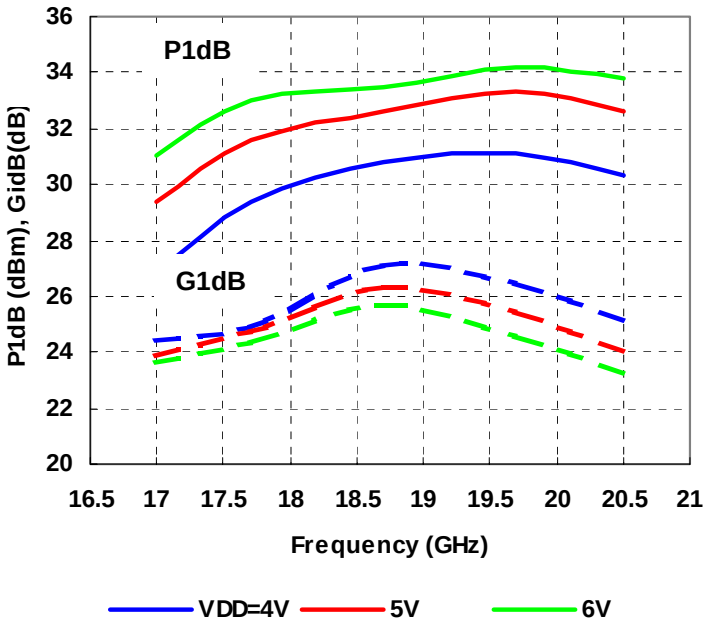
IMD vs Output Power

@VDD=6V, IDD(DC)=1400mA



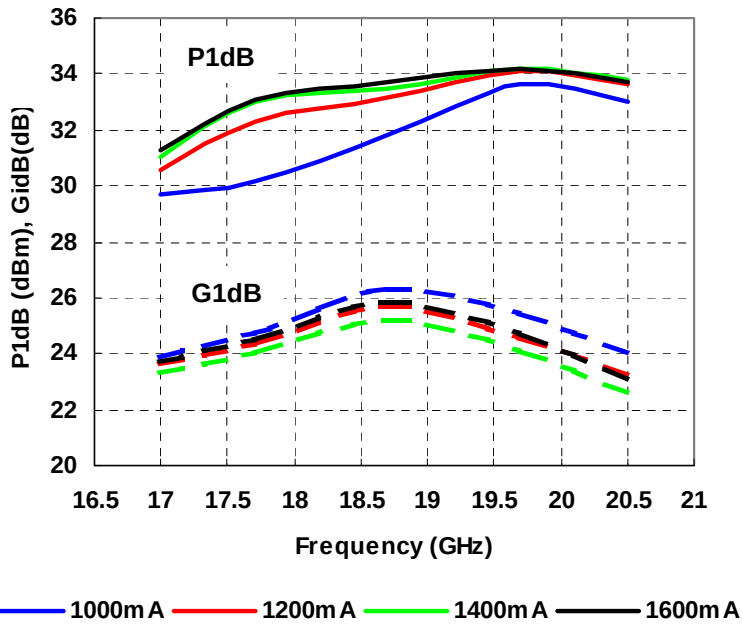
P1dB, G1dB vs. Frequency by Drain Voltage

@IDD(DC)=1400mA



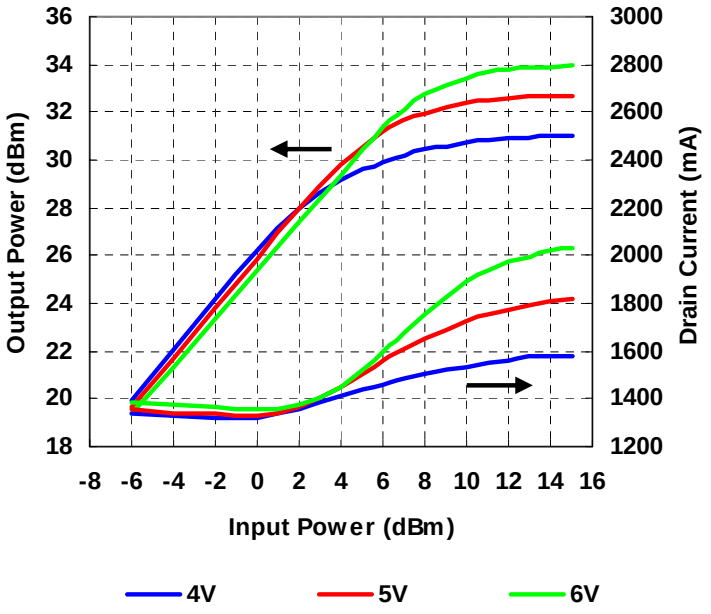
P1dB, G1dB vs. Frequency by Drain Current

@VDD=6V



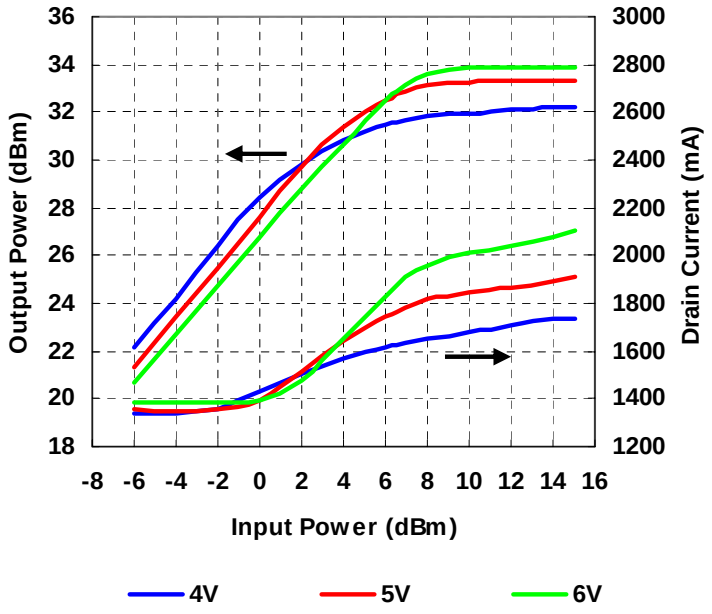
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=1400mA, Freq.=17.7GHz



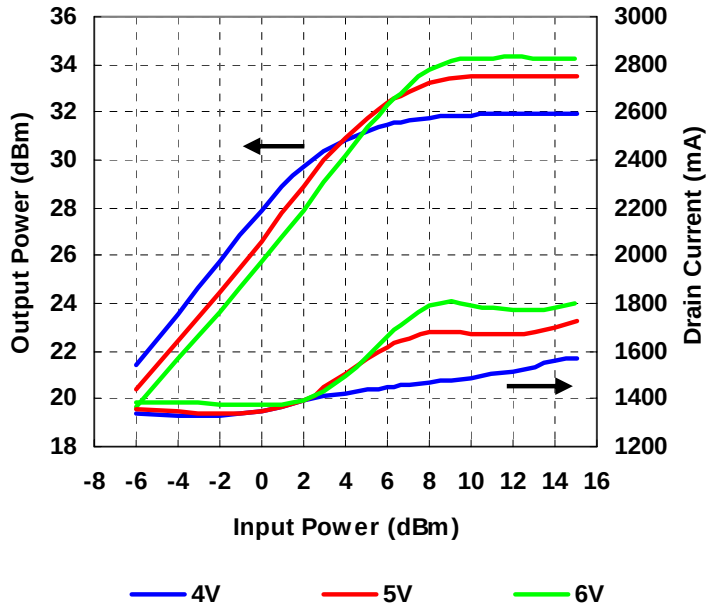
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=1400mA, Freq.=18.7GHz



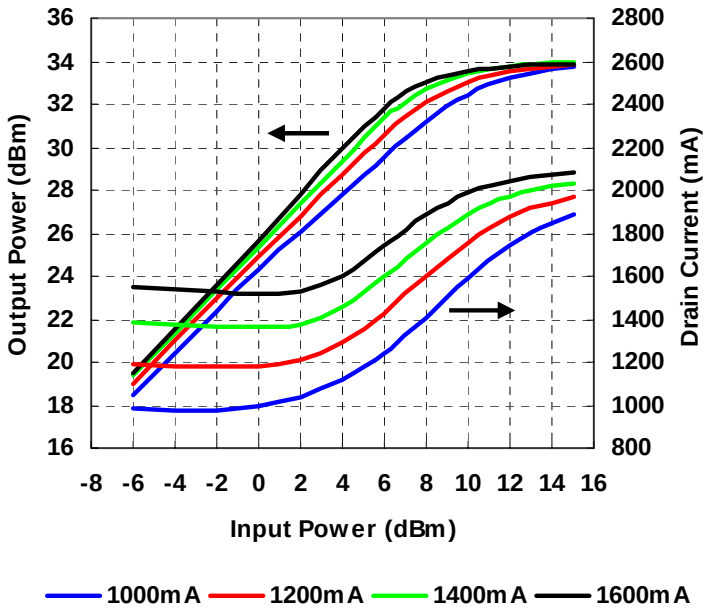
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=1400mA, Freq.=19.7GHz



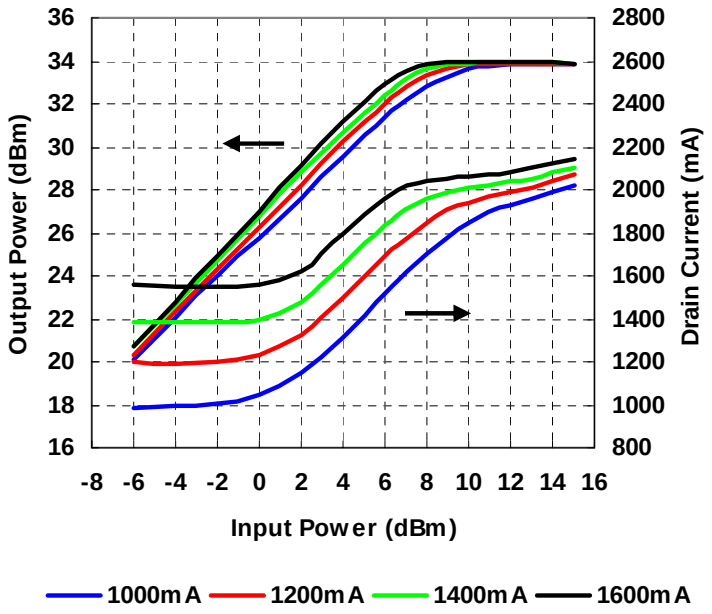
Output Power, Drain Current vs. Input Power by Drain Current

@VDD=6V, Freq.=17.7GHz



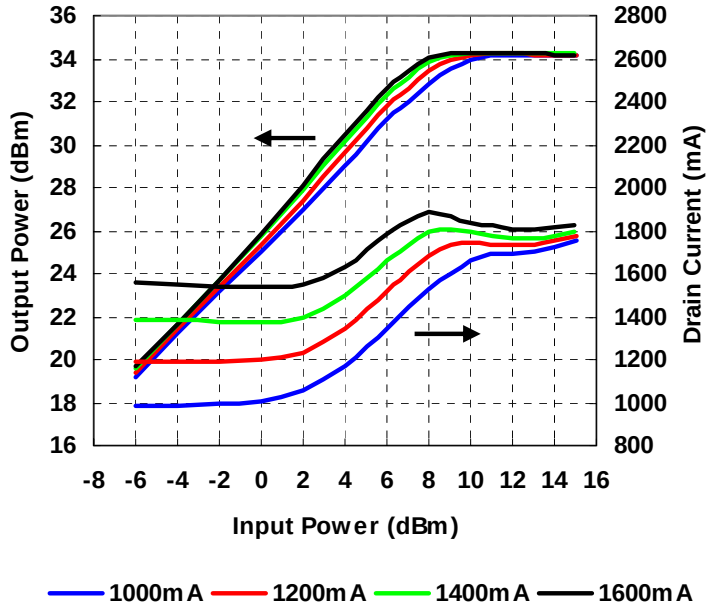
Output Power, Drain Current vs. Input Power by Drain Current

@VDD=6V, Freq.=18.7GHz



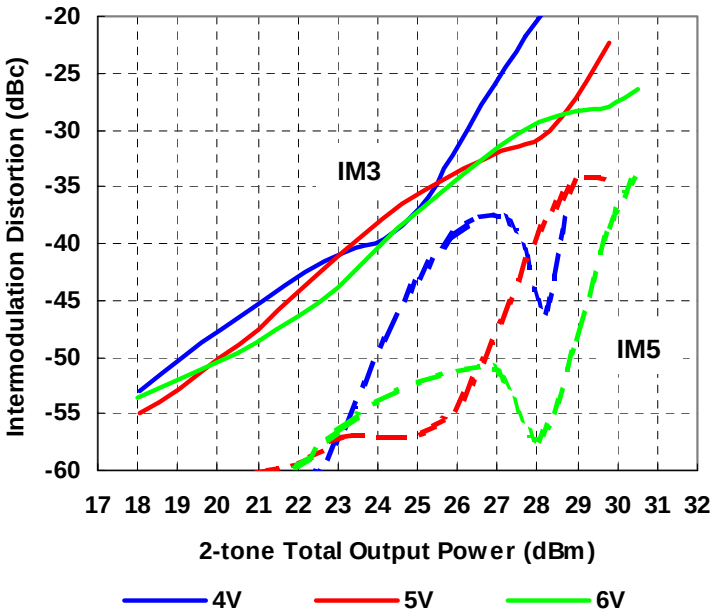
Output Power, Drain Current vs. Input Power by Drain Current

@VDD=6V, Freq.=19.7GHz



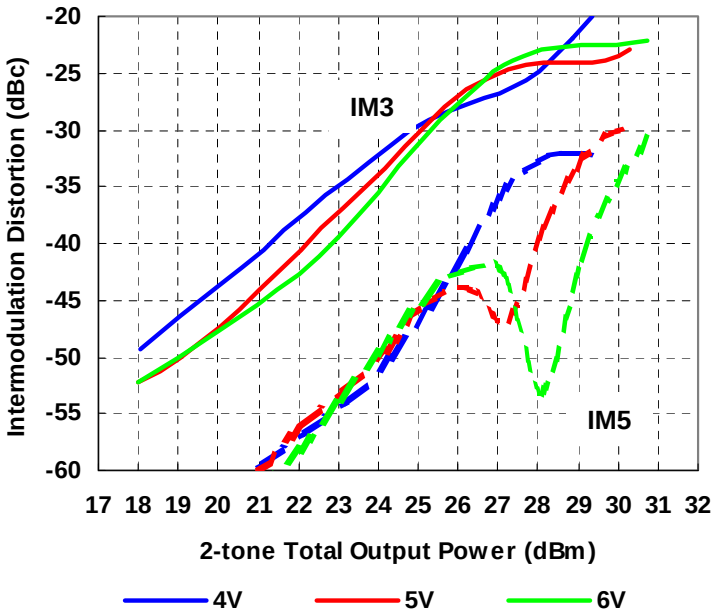
IMD Performance vs. Output Power by Drain Voltage

@IDD(DC)=1400mA, Freq.=17.7GHz



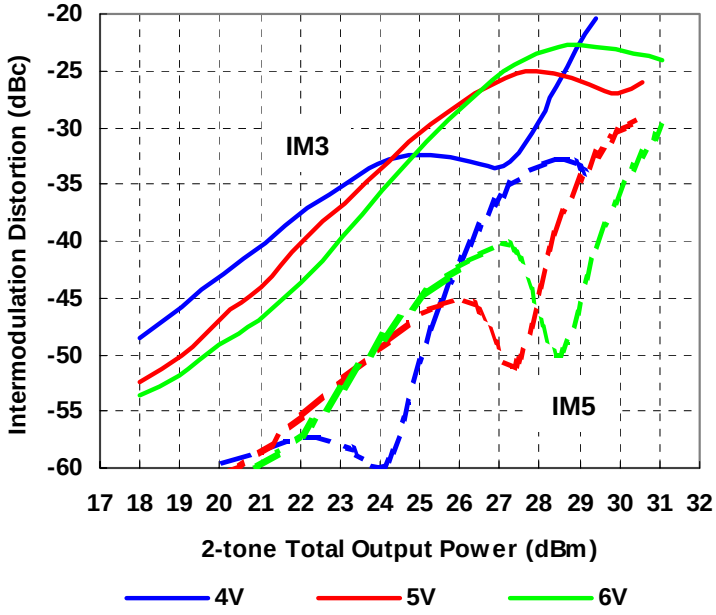
IMD Performance vs. Output Power by Drain Voltage

@IDD(DC)=1400mA, Freq.=18.7GHz



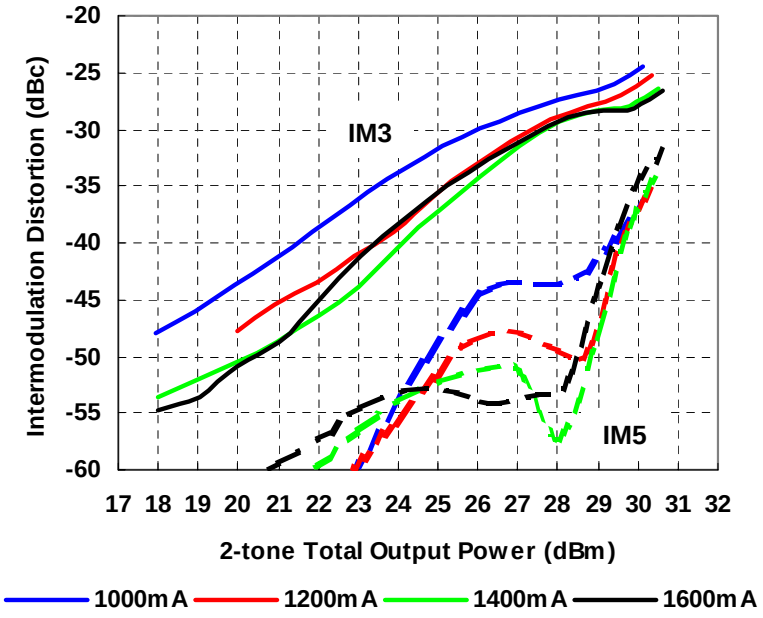
IMD Performance vs. Output Power by Drain Voltage

@IDD(DC)=1400mA, Freq.=19.7GHz



IMD Performance vs. Output Power by Drain Current

@VDD=6V, Freq.=17.7GHz



IMD Performance vs. Output Power by Drain Current

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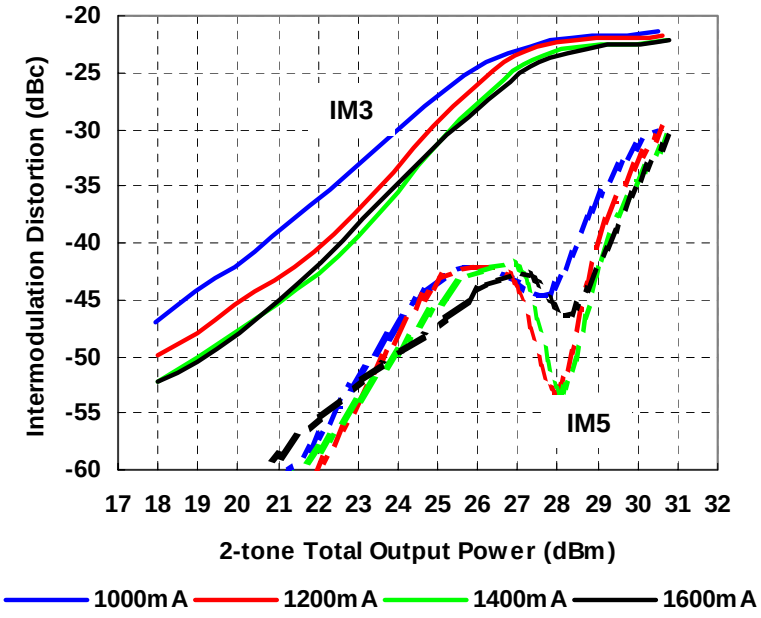
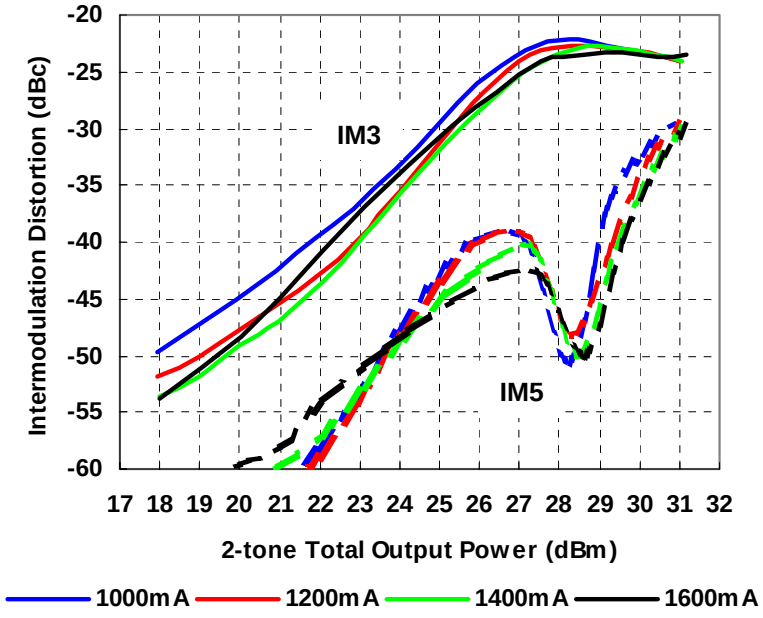


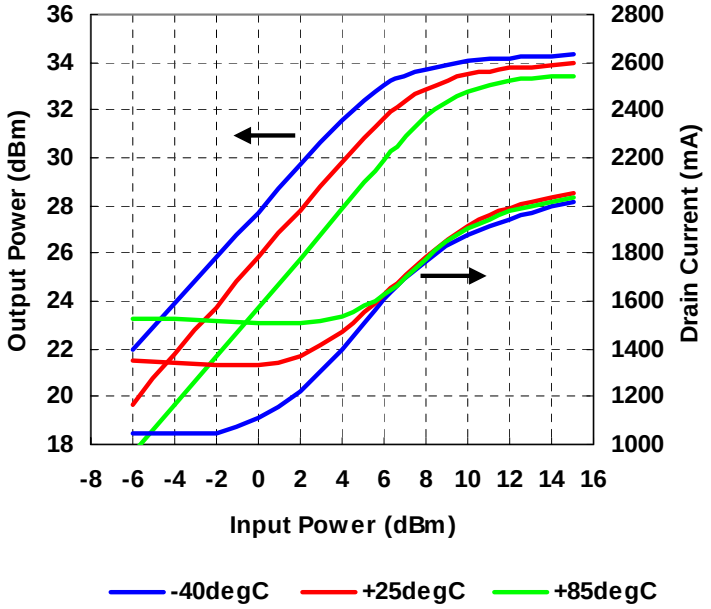
IMD Performance vs. Output Power by Drain Current

@VDD=6V, Freq.=19.7GHz



Output Power, Drain Current vs. Input Power by Temperature

@VDD=6V, IDD(DC)=1400mA(@Tc=+25degC), Freq.=17.7GHz



Output Power, Drain Current vs. Input Power by Temperature

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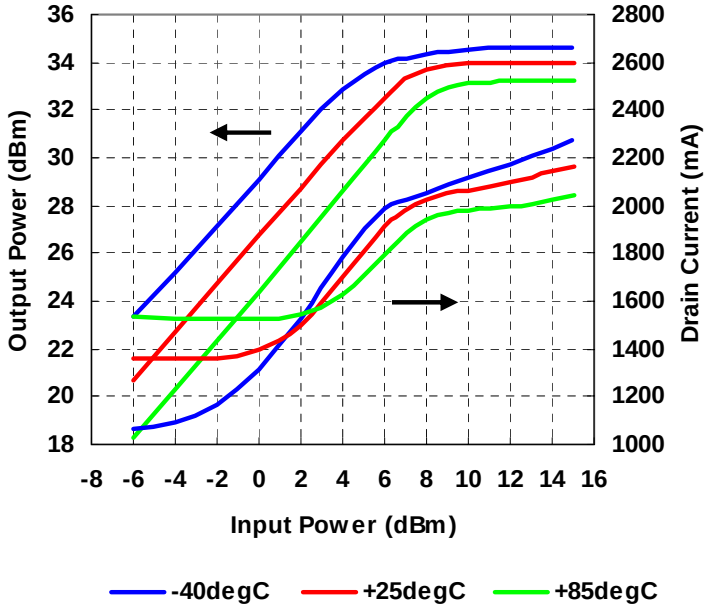
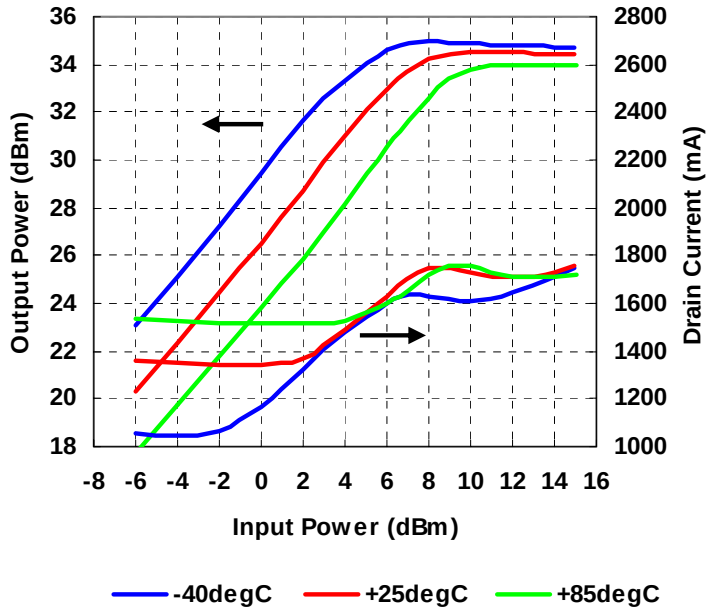


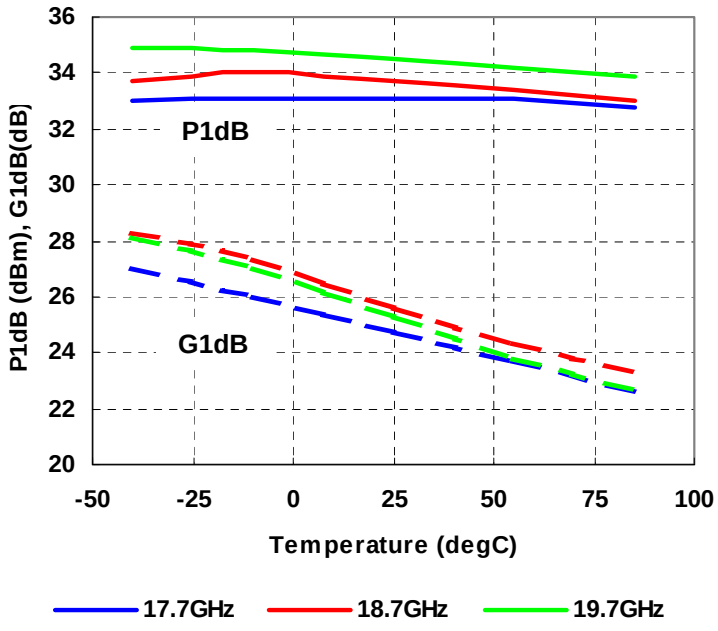
Output Power, Drain Current vs. Input Power by Temperature

@VDD=6V, IDD(DC)=1400mA(@Tc=+25degC), Freq.=19.7GHz



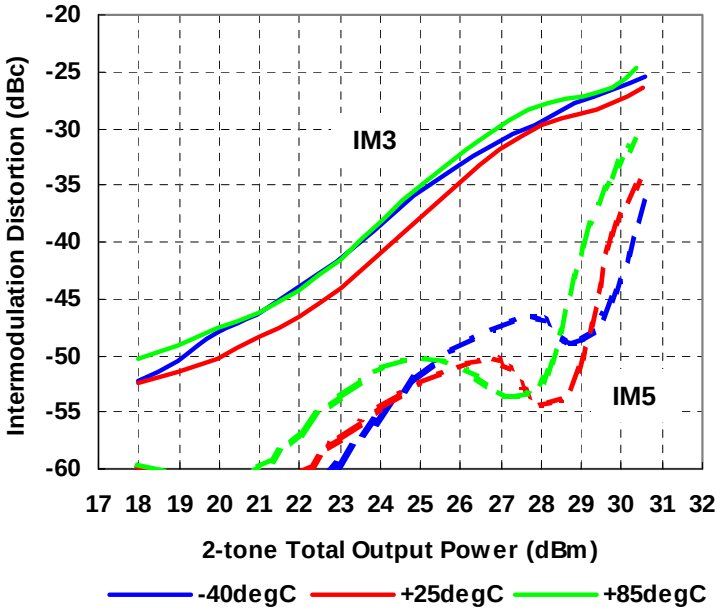
P1dB, G1dB vs. Temperature

@VDD=6V, IDD(DC)=1400mA(@Tc=+25degC)



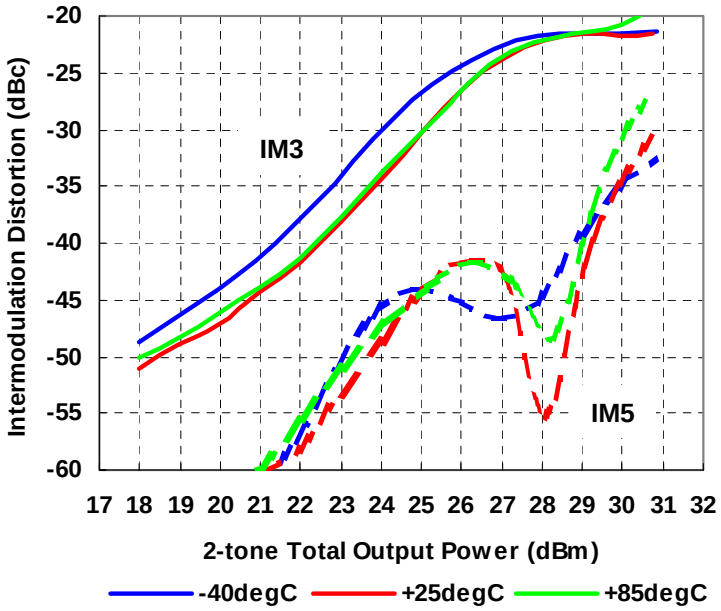
IMD Performance vs. Output Power by Temperature

@VDD=6V, IDD(DC)=1400mA(@Tc=+25degC), Freq.=17.7GHz



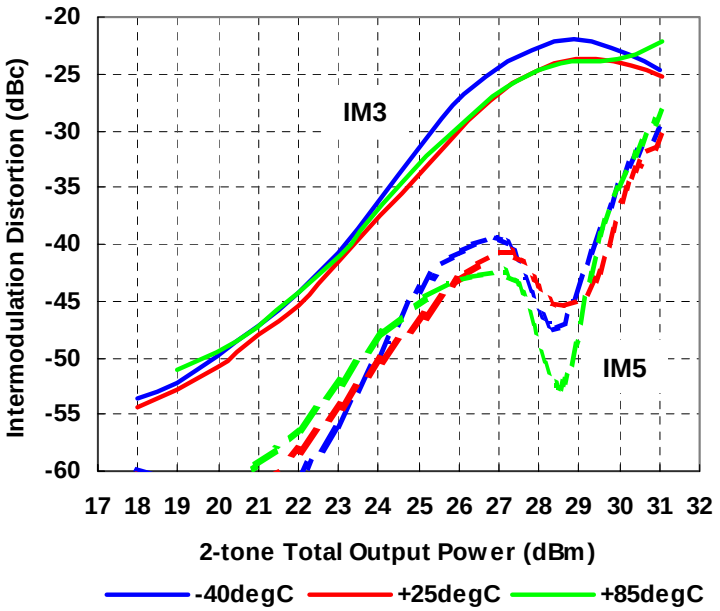
IMD Performance vs. Output Power by Temperature

@VDD=6V, IDD(DC)=1400mA(@Tc=+25degC), Freq.=18.7GHz



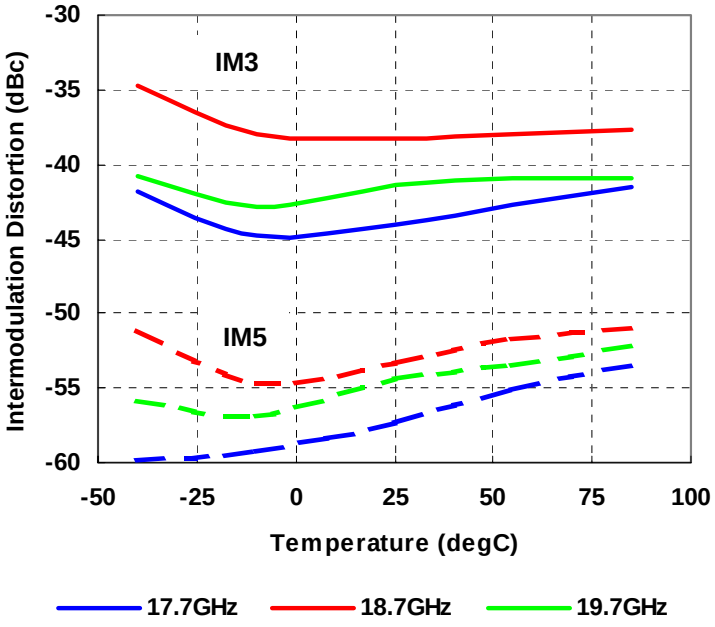
IMD Performance vs. Output Power by Temperature

@VDD=6V, IDD(DC)=1400mA(@Tc=+25degC), Freq.=19.7GHz

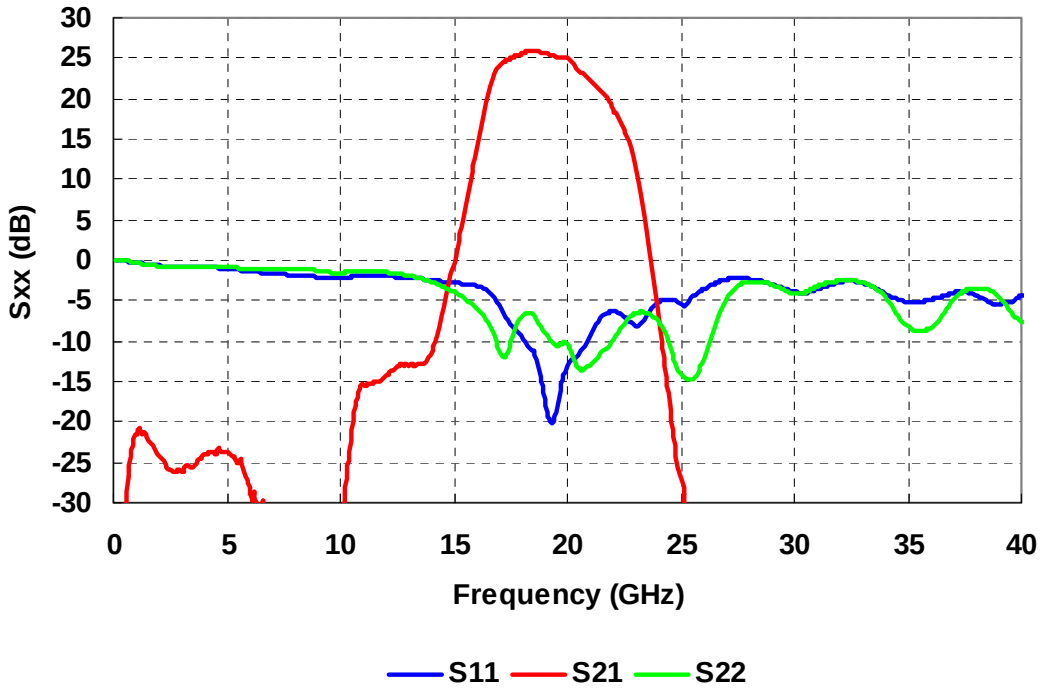


IMD vs. Temperature

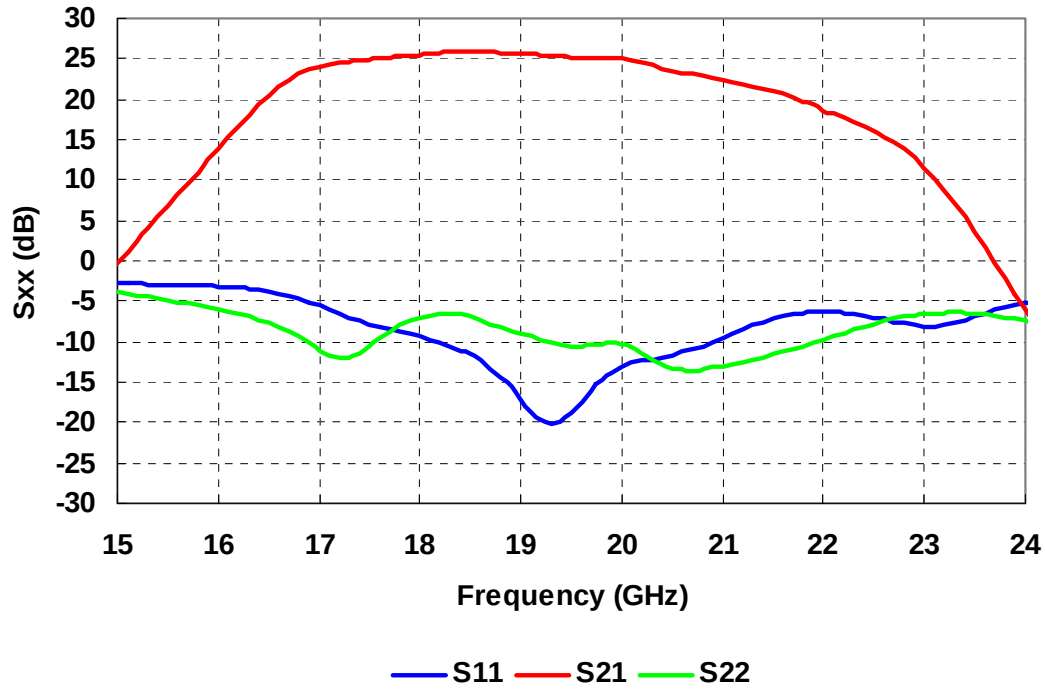
@VDD=6V, IDD(DC)=1400mA(@Tc=+25degC) Pout=20dBm(S.C.L.)



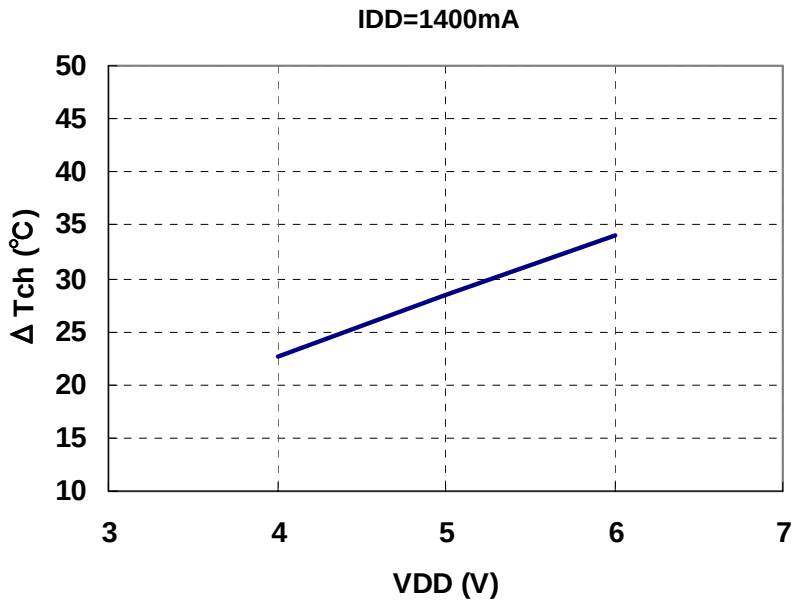
■S-PARAMETERS @VDD=6V, IDD=1400mA



@VDD=6V, IDD=1400mA

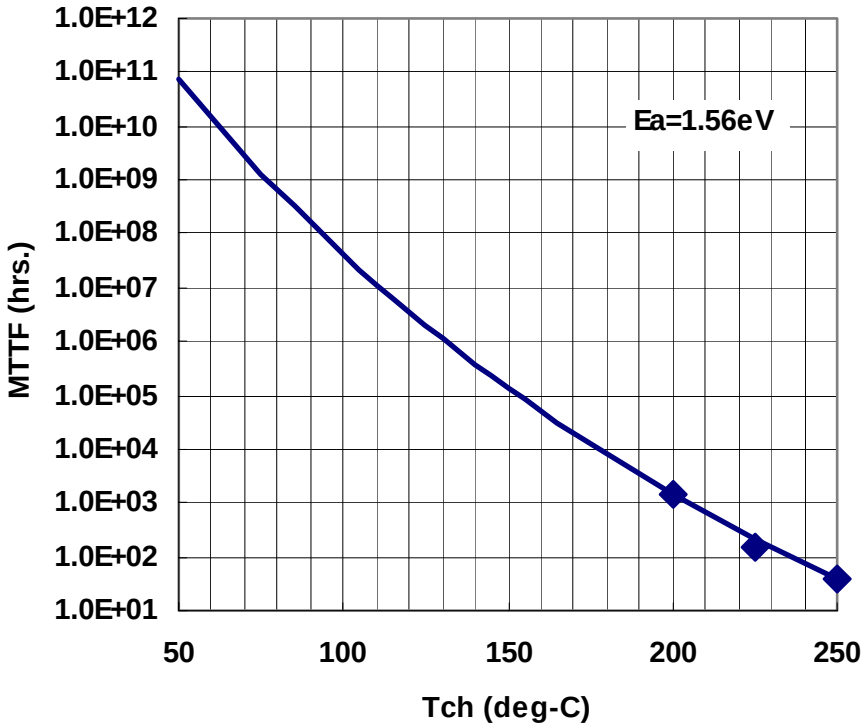


ΔTch vs. Drain Voltage (Reference)

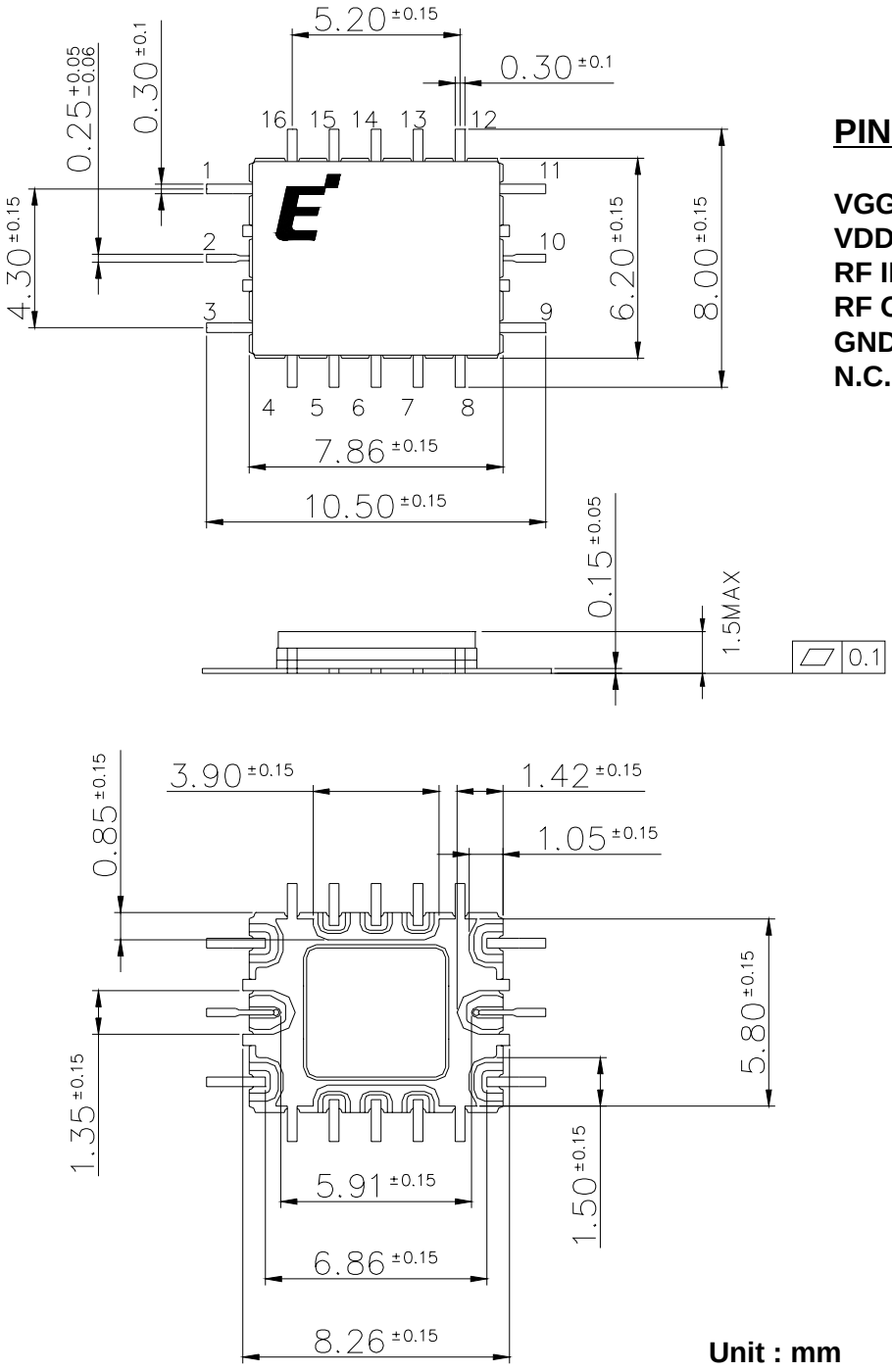


Note: ΔTch : Temperature Rise from Backside of the Package to Channel.

MTTF vs. Tch



■Package Outline and Pin Assignment

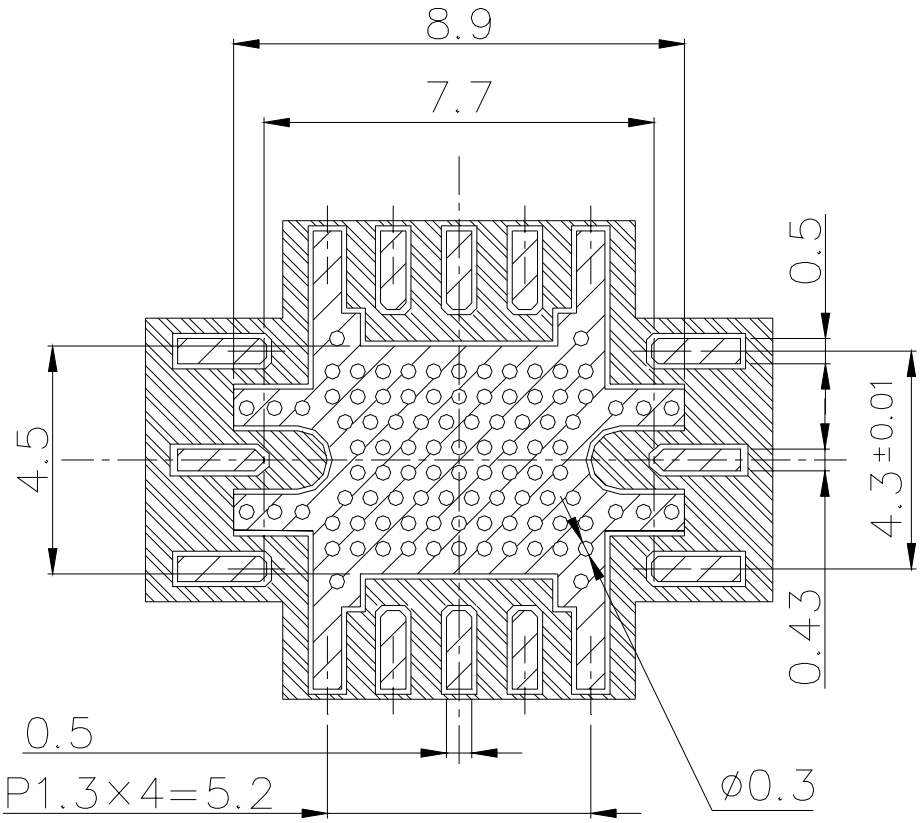


PIN Assignment

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

Unit : mm

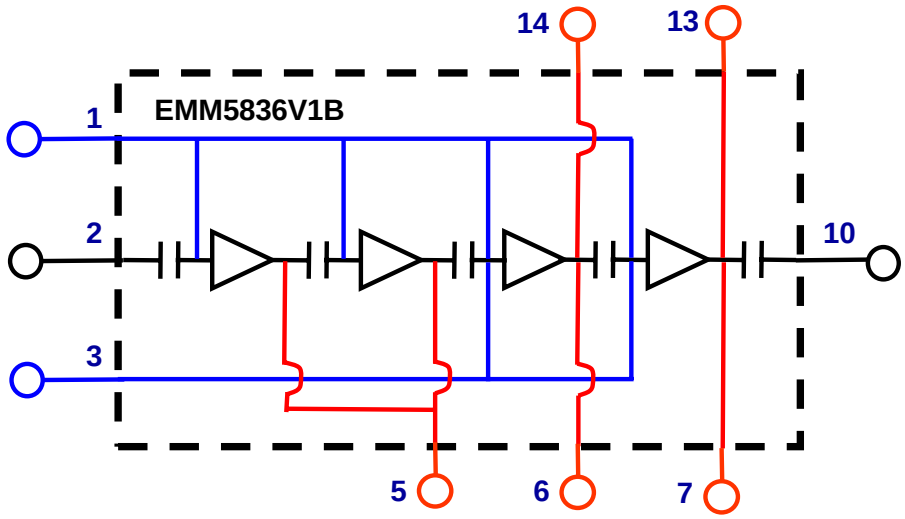
■ PCB Pads and Solder-resist Pattern



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

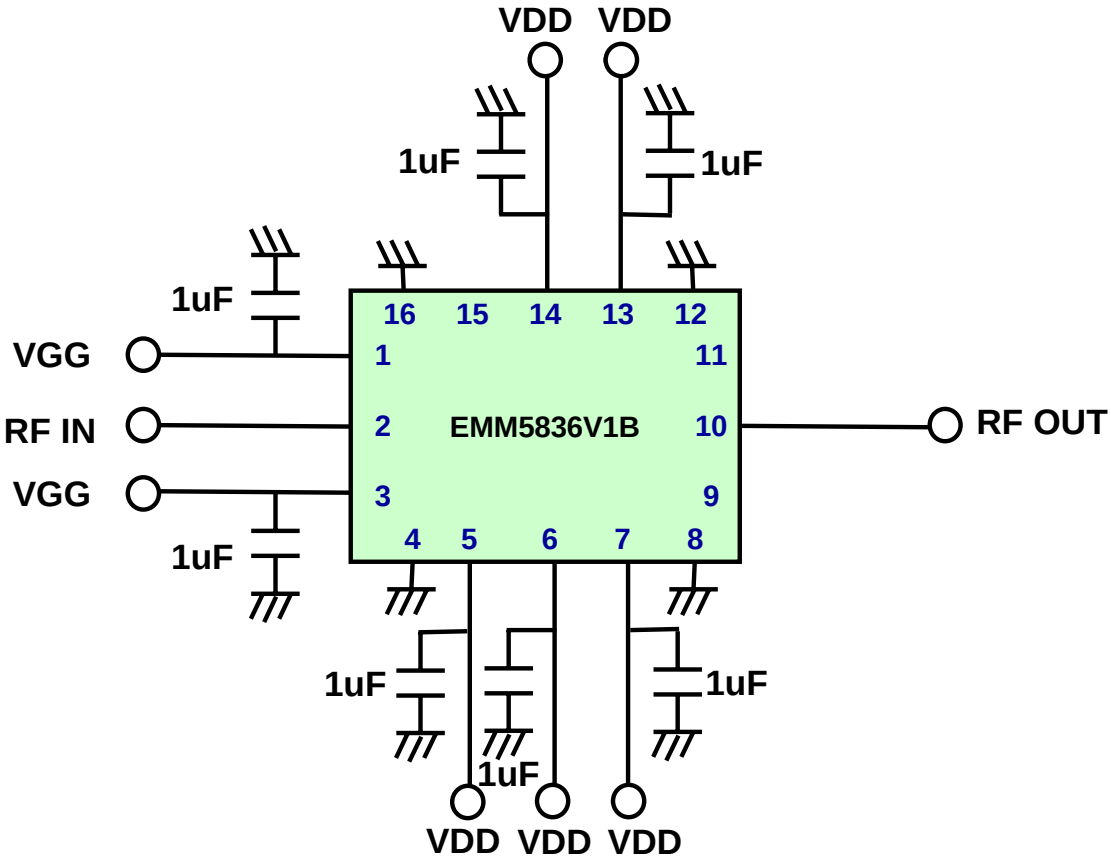
■Block Diagram



PIN Assignment

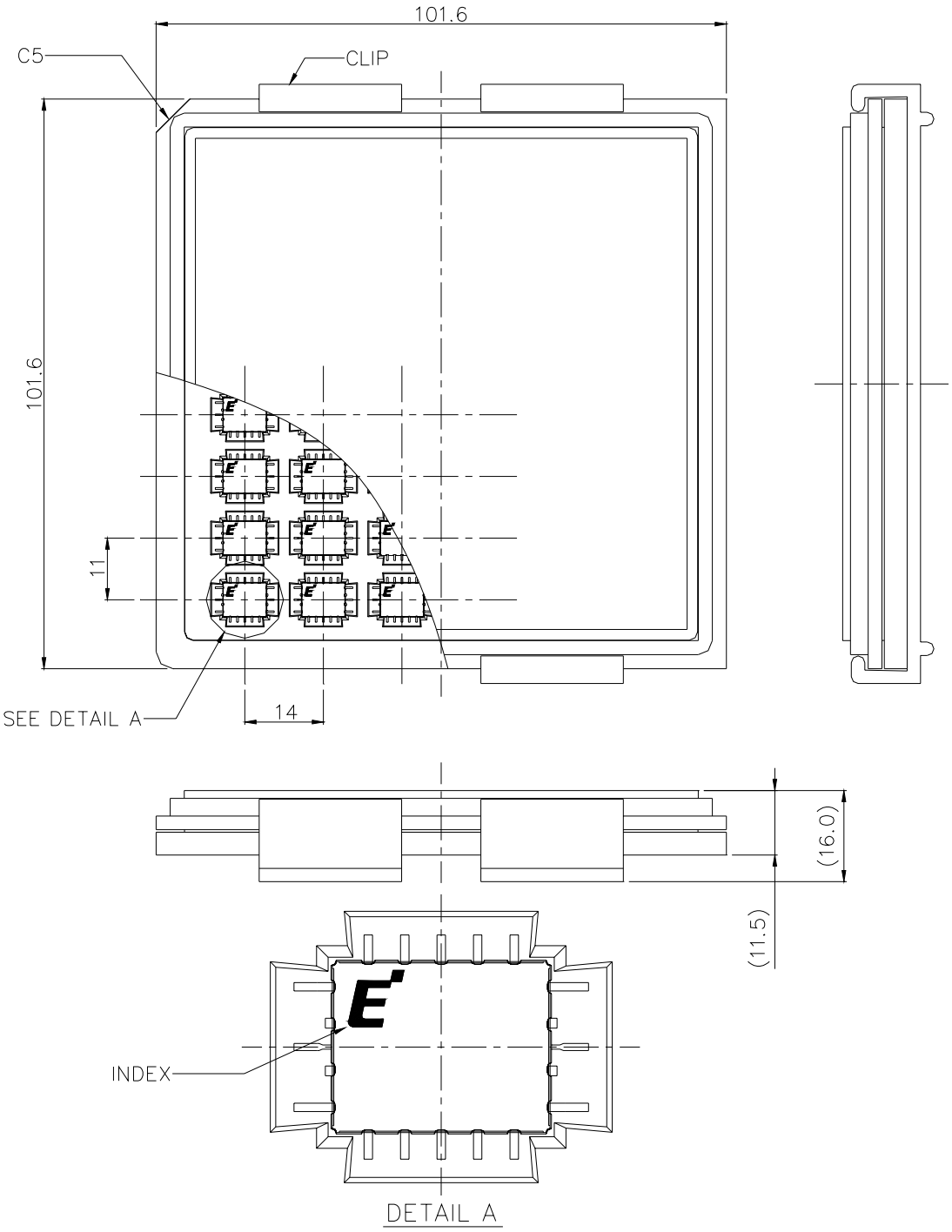
VGG : 1, 3
VDD : 5, 6, 7, 13, 14
RF IN : 2
RF OUT : 10
GND : 4, 8, 12, 16
N.C. : 9, 11, 15

■Recommended Bias Network



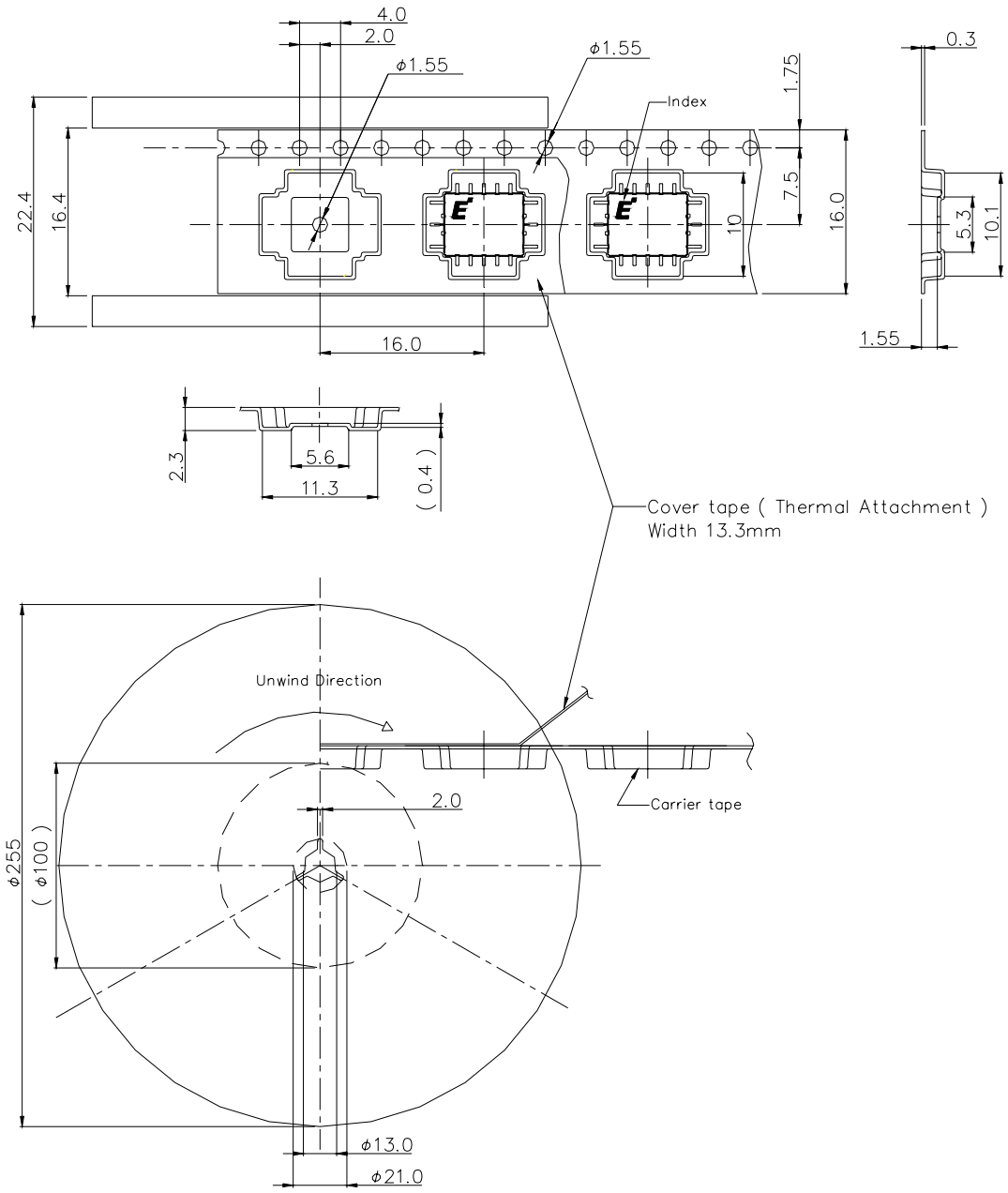
NOTE: All the VDD and VGG should be biased.

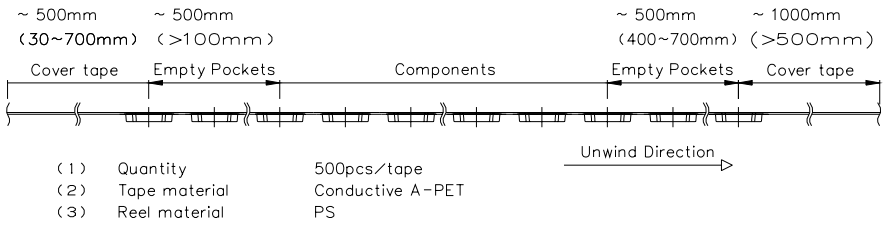
■ 4-inch Tray Packing (Part No. : EMM5836V1B)



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

■ Tape and Reel Packing (Part No. : EMM5836V1BT)





(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

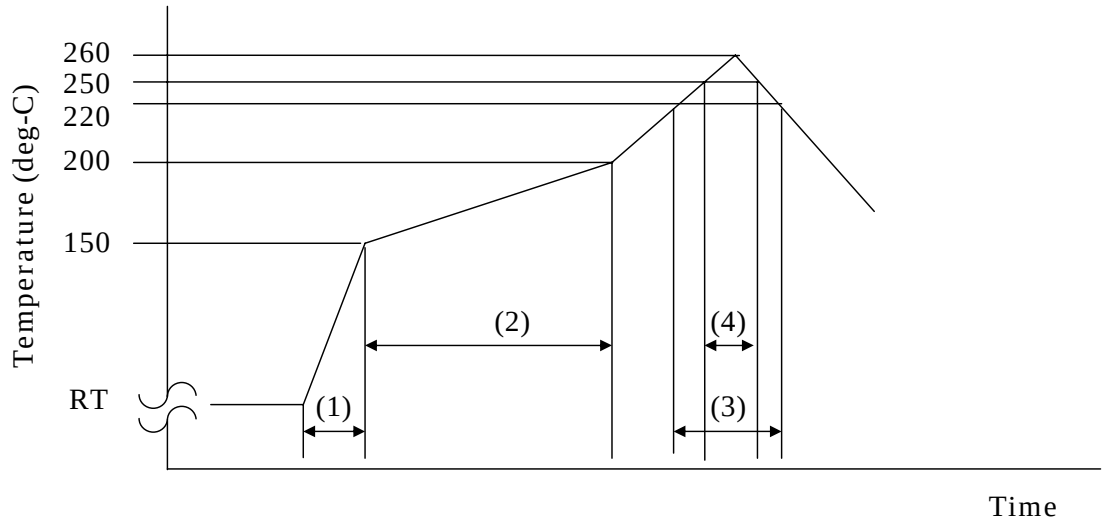
Mounting Condition

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 lead.

Reflow temperature profile and condition:



(1) Average Ramp-up Rate:	3deg-C/seconds	
(2) Preheating:	150 - 200deg-C,	60 - 180seconds
(3) Main heating:	220deg-C,	60seconds max.
(4) Peak Temperature:	260deg-C max., more than 250deg-C,	10 seconds max.

* Measurement point: Device lead.

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 :

Sumitomo Electric Device Innovations, U.S.A., Inc.
2355 Zanker Rd.
San Jose, CA 95131-1138, U.S.A.
TEL: +1 408 232-9500
FAX: +1 408 428-9111

Eudyna Devices Europe Ltd.
150 Edinburgh Avenue
Slough, Berkshire, SL1 4SS
United Kingdom
TEL: +44 (0) 1753-849950
FAX: +44 (0) 1753-577128

Eudyna Devices International Srl
Via Teglio 8/2 - 20158
Milano, Italy
TEL: +39-02-37052921
FAX: +39-02-37052920

Eudyna Devices Asia Pte. Ltd.
Hong Kong Branch
Suite 1906B, Tower 6, China Hong Kong City
33 Canton Road, Tsimshatsui, Kowloon
Hong Kong
TEL: +852-2377-0227
FAX: +852-2377-3921

Sumitomo Electric Device Innovations, Inc.
1000 Kamisukiahara, showa-cho
Nakakomagun, Yamanashi
409-3883, Japan
(Kokubo Industrial Park)
TEL +81-55-275-4411
FAX +81-55-275-9461

Sumitomo Electric Industries, Ltd.
Head Office (Tokyo)
3-9-1, Shibaura, Minato-ku, Tokyo 108-8539,
Japan
TEL +81-3-6722-3287
FAX +81-3-6722-3284

CAUTION

Sumitomo Electric Device Innovations, Inc. products 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.