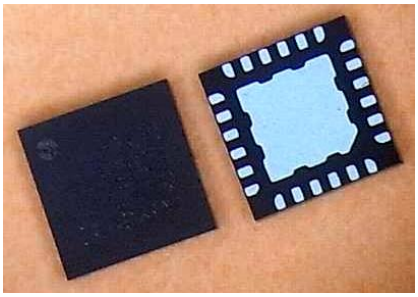
■ Features

- High Output Power: P1dB=26.0dBm (Typ.)
- High Gain: GL=30.0dB (Typ.)
- Wide Frequency Band : 3.4 to 8.5 GHz
- Impedance Matched Zin/Zout = 50ohm
- QFN 24pin Plastic Mold Package(ZV)



■ Description

The EMM5078ZV is a wide band power amplifier MMIC that contains a three stage amplifier, internally matched, for standard communications band in 3.4 to 8.5GHz frequency range. Sumitomo Electric'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}	22	dBm
Storage Temperature	T_{stg}	-55 to +125	deg.C

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Condition	Unit
Drain-Source Voltage	V_{DD}	<=6	V
Input Power	P_{in}	<=2	dBm
Operating Backside Temperature	T_{OP}	-40 to +85	deg.C

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

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Frequency Range	f	VDD=6V IDD(DC)=300mA(typ.) Zs=Zl=50ohm * : Δf=10MHz, 2-tone Test Pout=15.0dBm (S.C.L.)	3.4	-	8.5	GHz
Output Power at 1dB G.C.P.	P_{1dB}		23.0	26.0	-	dBm
Power Gain at 1dB G.C.P.	G_{1dB}		24.0	29.0	-	dB
Power Added Efficiency at 1dB G.C.P.	PAE		-	18.0	-	%
3rd Order Inter Modulation*	IM_3		-35.0	-40.0	-	dBc
Drain Current at 1dB G.C.P.	I_{DD}		-	350	450	mA
Input Return Loss (at Pin=-20dBm)	RL_{in}		-	-10.0	-	dB
Output Return Loss (at Pin=-20dBm)	Rlout		-	-10.0	-	dB

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

CASE STYLE	ZV	
RoHS Compliance	YES	
ESD*1	Class 0	=<250V
MSL*2	3	

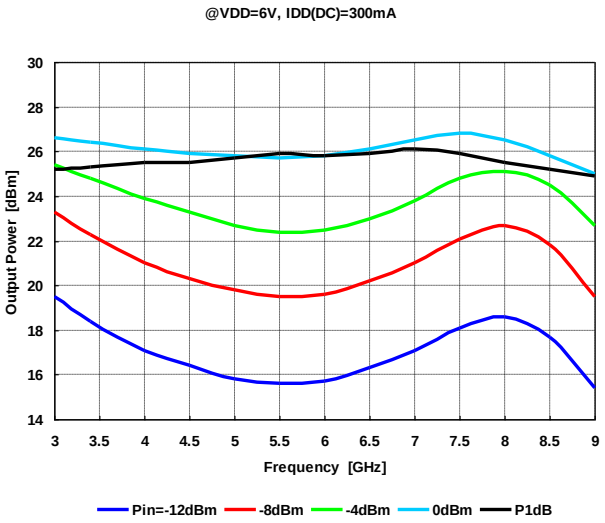
Note(*1) : Based on JEDEC JESD22-A114C(C=100pF,R=1.5kohm)
Note(*2) : Based on IPC/JEDEC J-STD-020C

Ordering Information

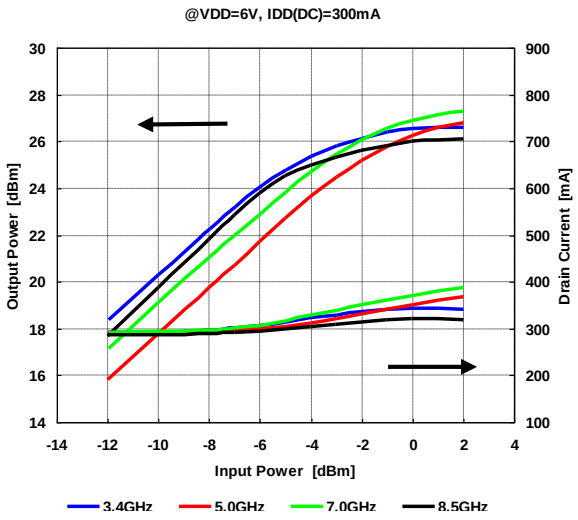
Model Type	Order Unit	Packing Style
EMM5078ZV	No Limitation	490pcs./Tray x 10Trays=4900pcs./Packing
EMM5078ZVT	500pcs.	500pcs./Reel x 1Reel=500pcs./Pack

● RF Characteristics

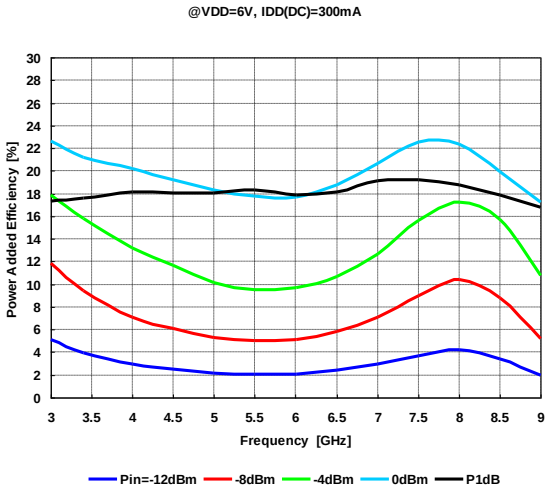
Output Power vs. Frequency



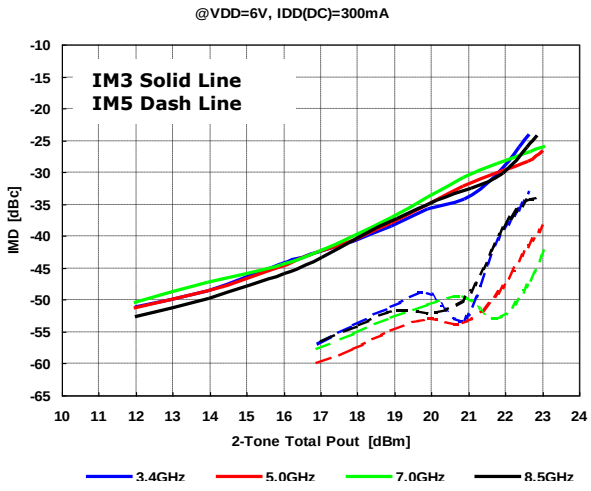
Output Power, Drain Current vs. Input Power



Power Added Efficiency vs. Frequency

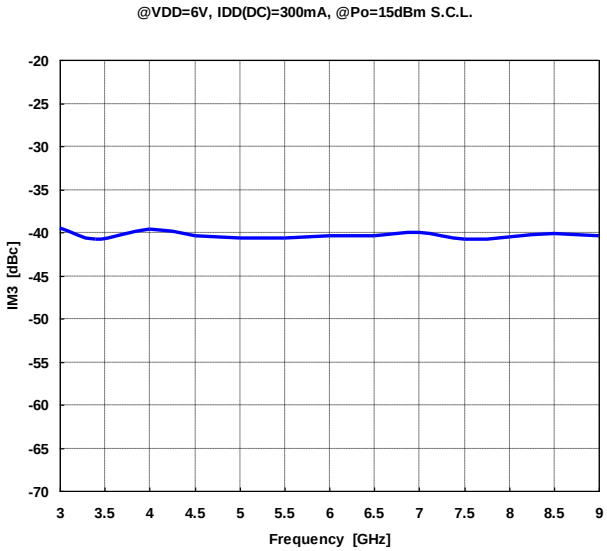


IMD vs. Output Power

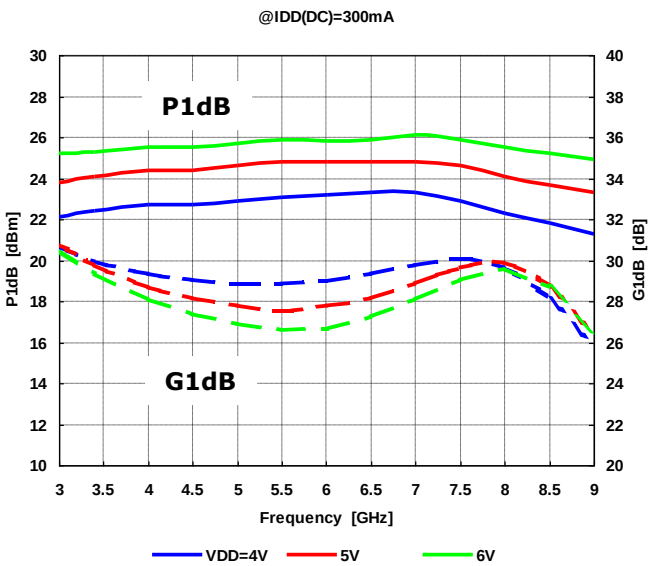


● RF Characteristics

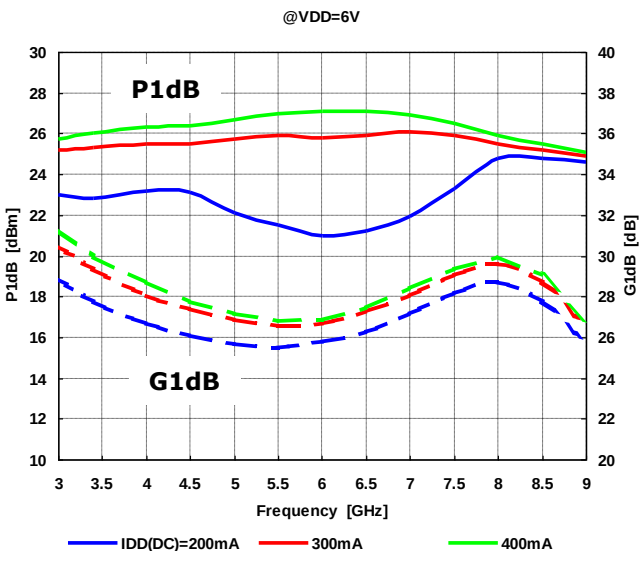
IM3 vs. Frequency



P1dB, G1dB vs. Frequency by Drain Voltage

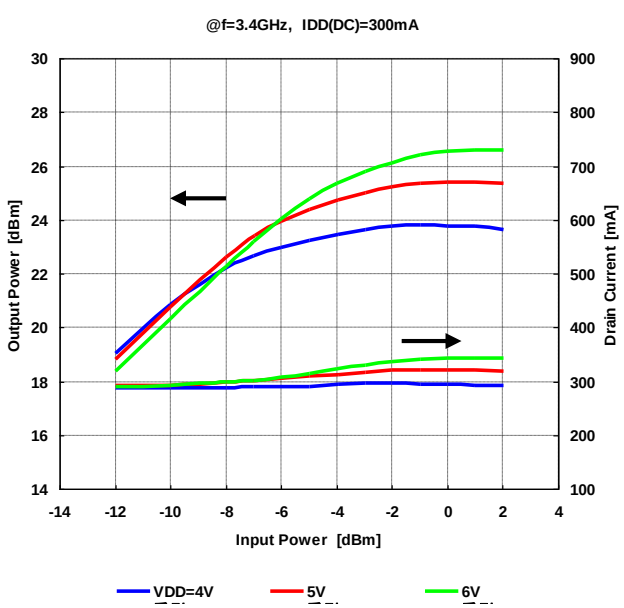


P1dB, G1dB vs. Frequency by Drain Current

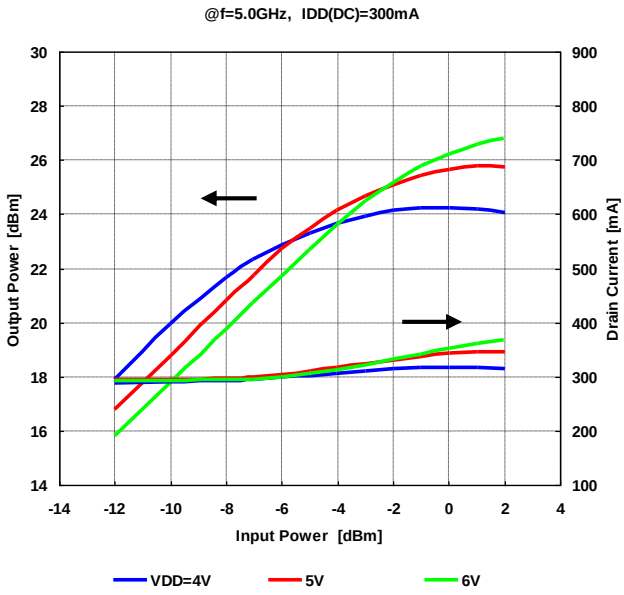


● RF Characteristics

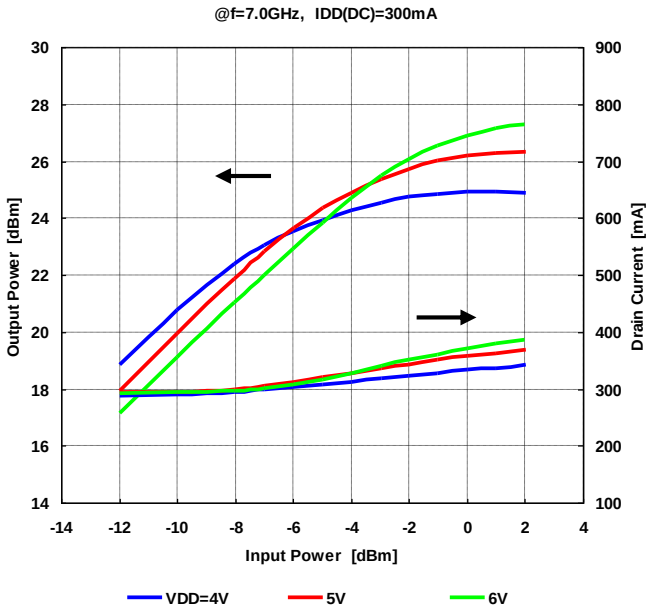
Output Power, Drain Current vs. Input Power by Drain Voltage



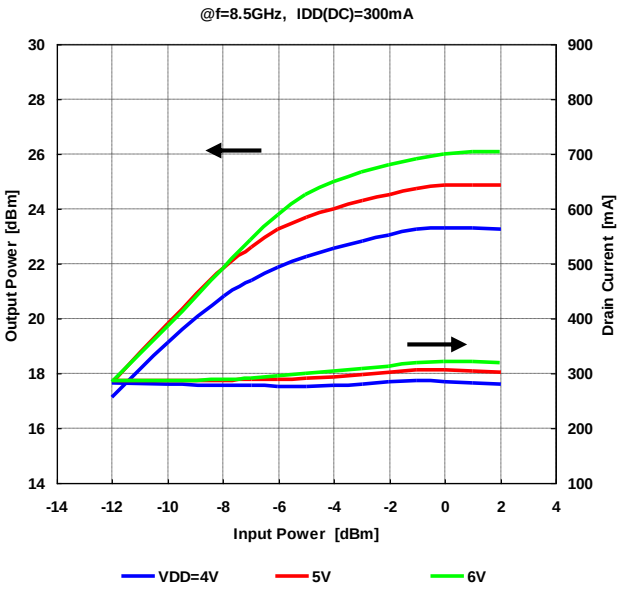
Output Power, Drain Current vs. Input Power by Drain Voltage



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

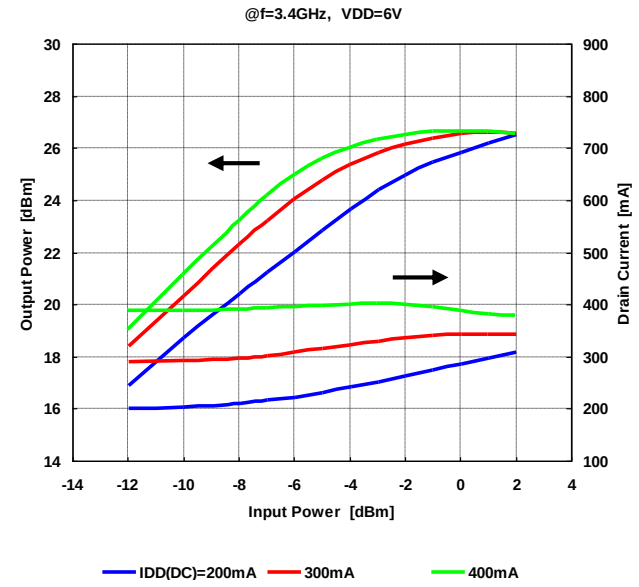


Output Power, Drain Current vs. Input Power by Drain Voltage

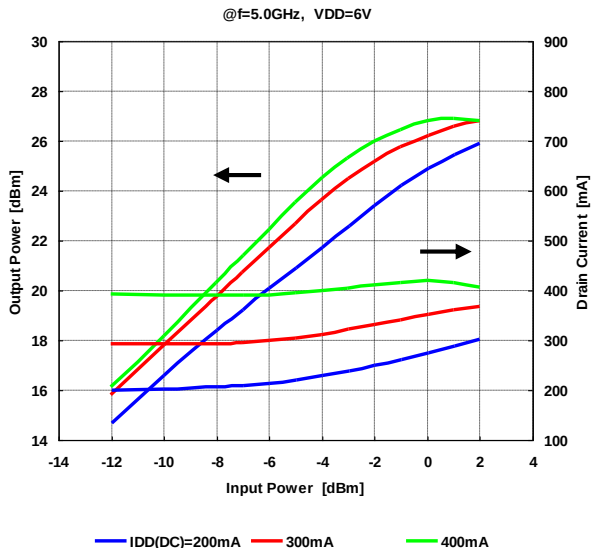


● RF Characteristics

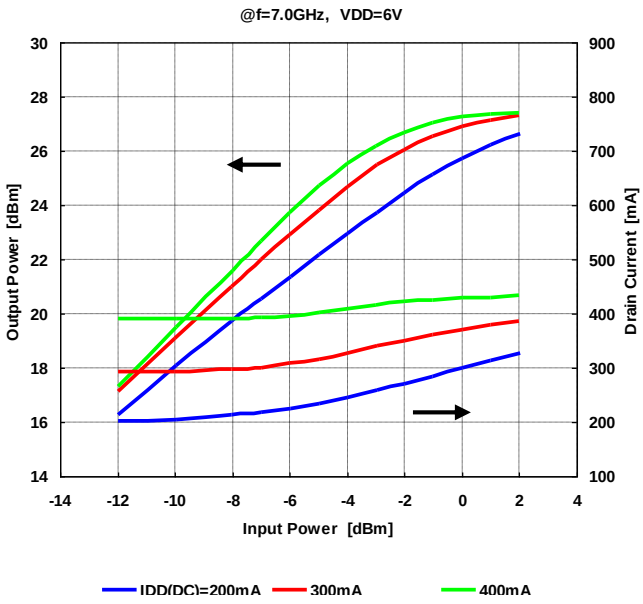
Output Power, Drain Current vs. Input Power by Drain Current



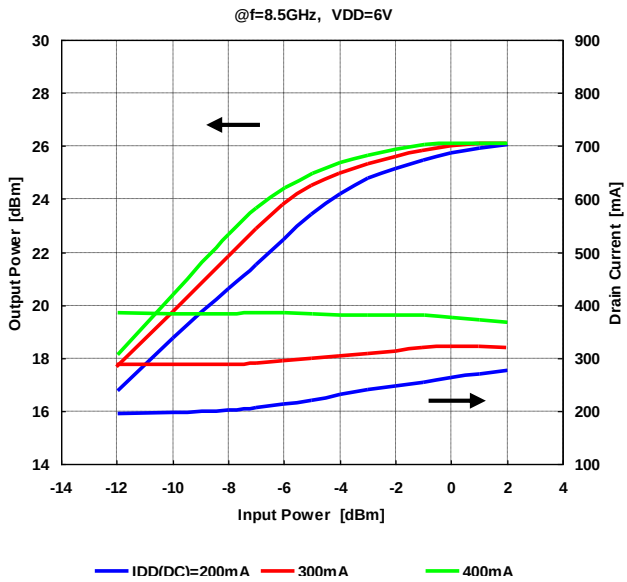
Output Power, Drain Current vs. Input Power by Drain Current



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

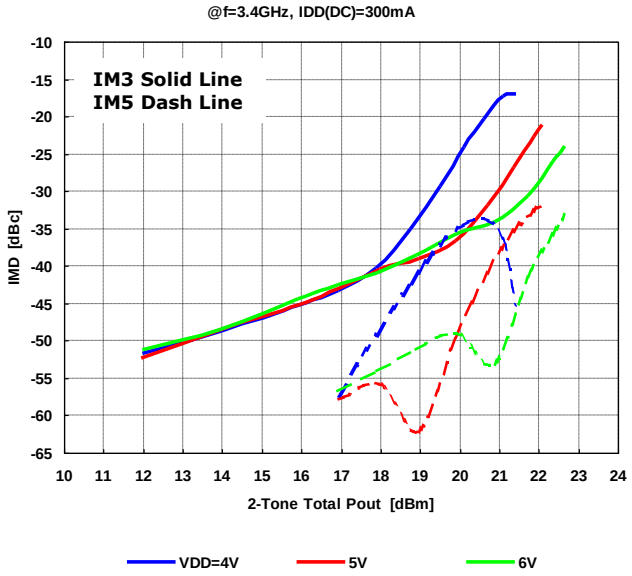


Output Power, Drain Current vs. Input Power by Drain Current

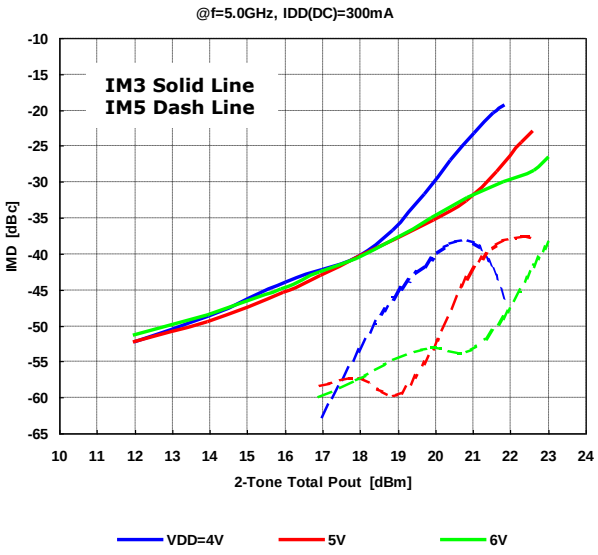


● RF Characteristics

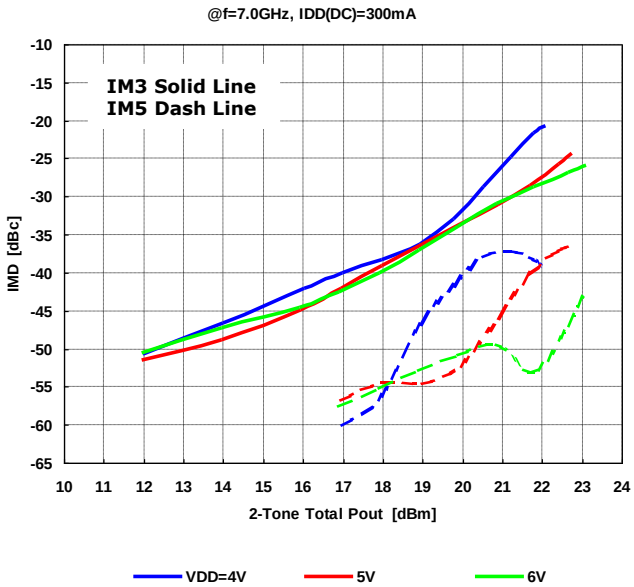
IMD Performance vs. Output Power by Drain Voltage



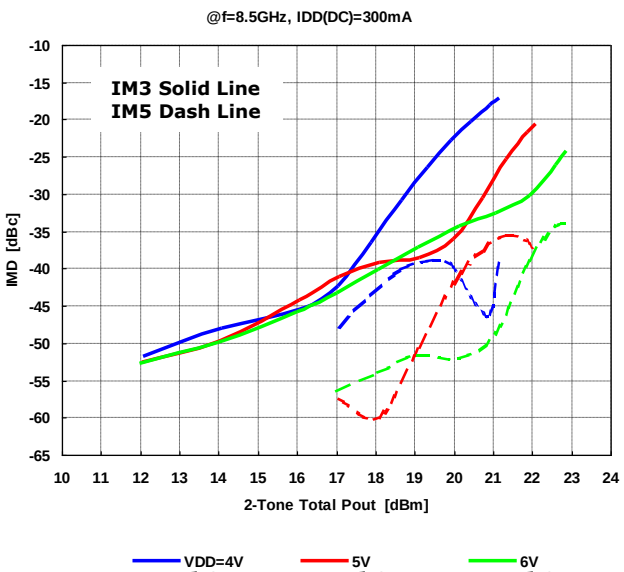
IMD Performance vs. Output Power by Drain Voltage



IMD Performance vs. Output Power by Drain Voltage

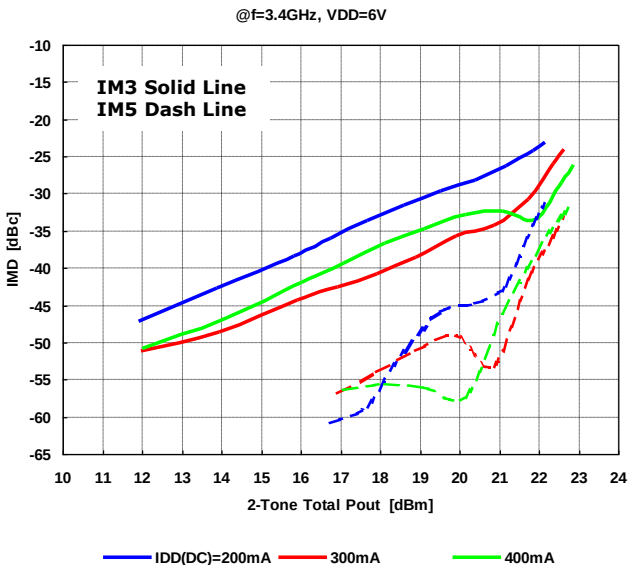


IMD Performance vs. Output Power by Drain Voltage

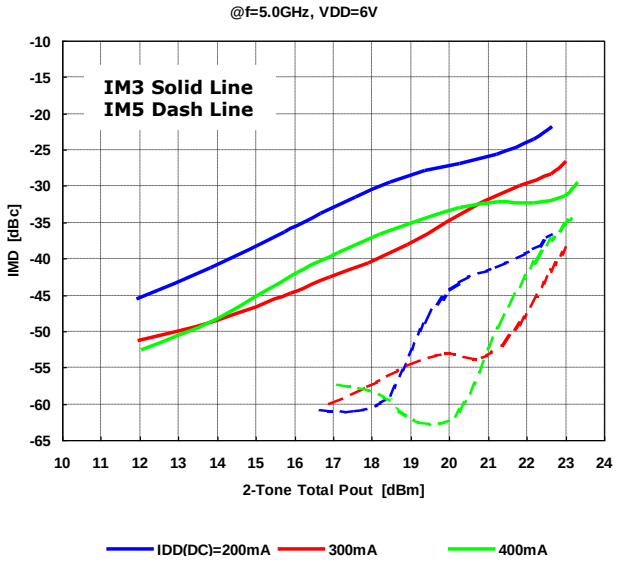


● RF Characteristics

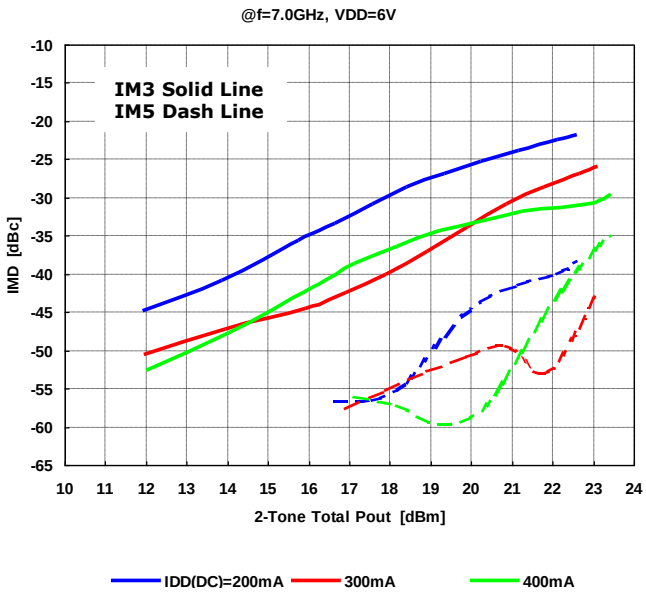
IMD Performance vs. Output Power by Drain Current



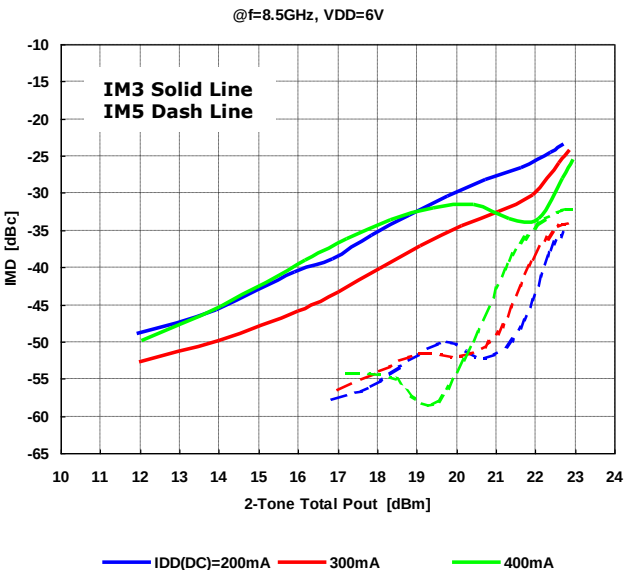
IMD Performance vs. Output Power by Drain Current



IMD Performance vs. Output Power by Drain Current

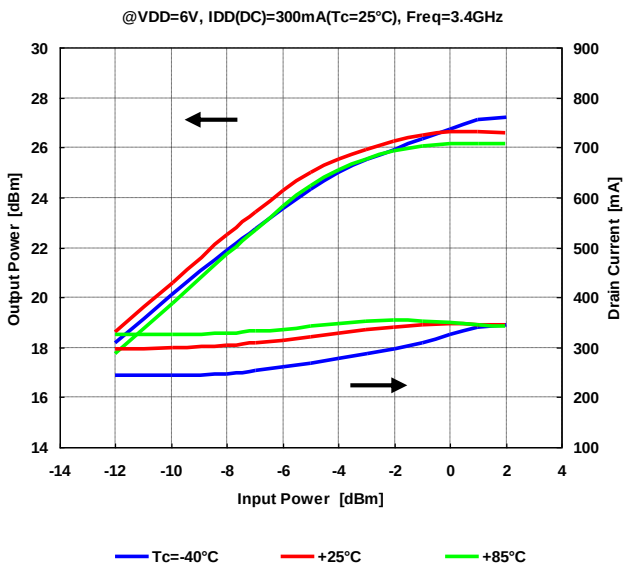


IMD Performance vs. Output Power by Drain Current

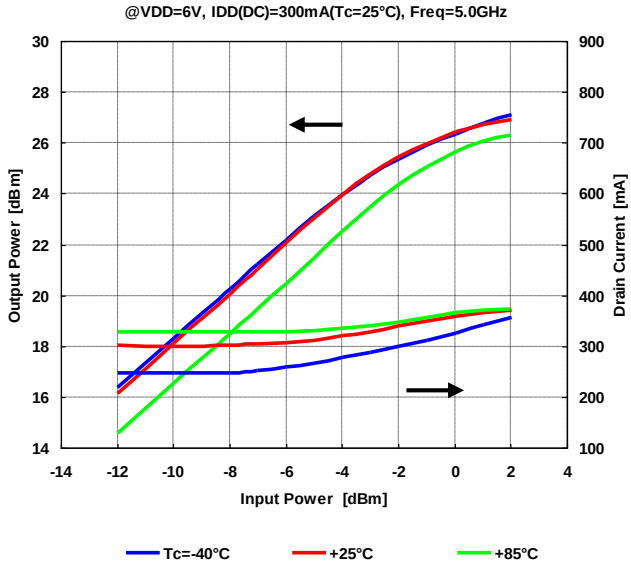


● RF Characteristics

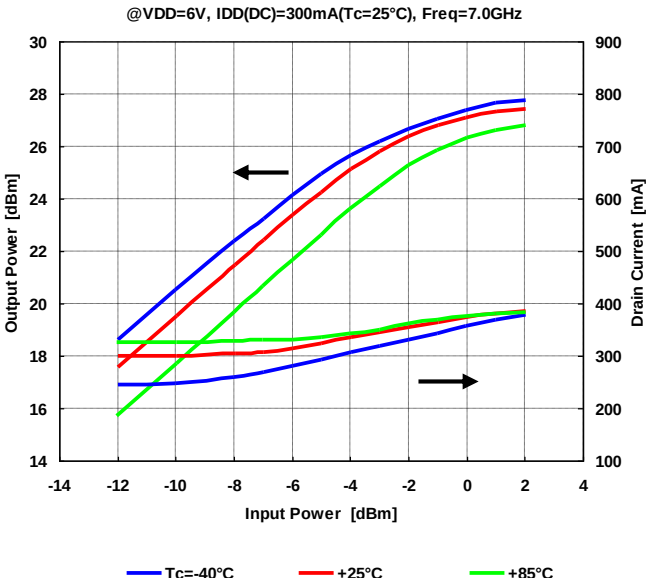
Output Power, Drain Current vs. Input Power by Temperature



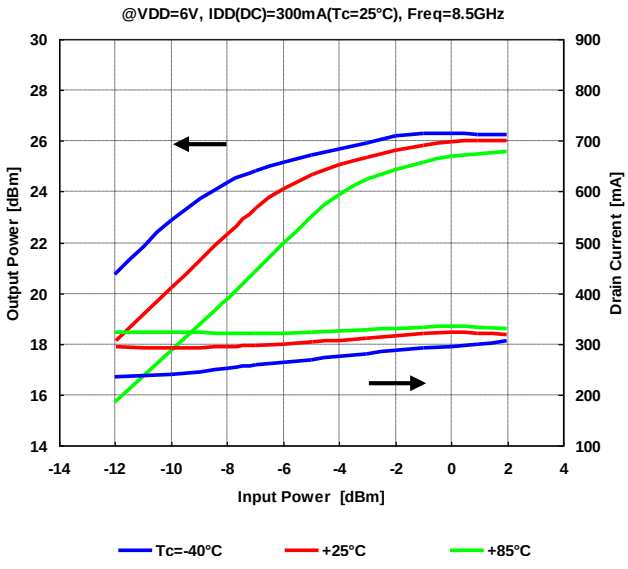
Output Power, Drain Current vs. Input Power by Temperature



Output Power, Drain Current vs. Input Power by Temperature

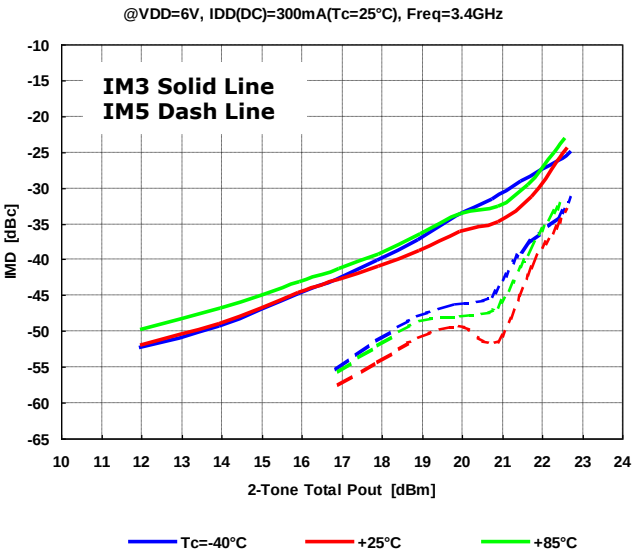


Output Power, Drain Current vs. Input Power by Temperature

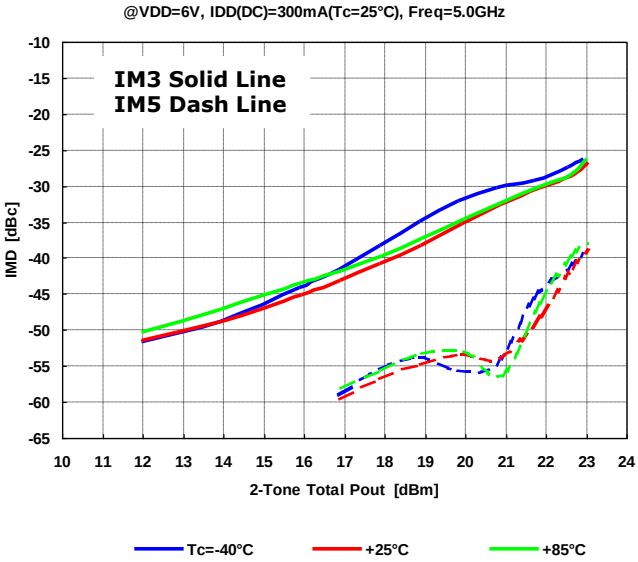


● RF Characteristics

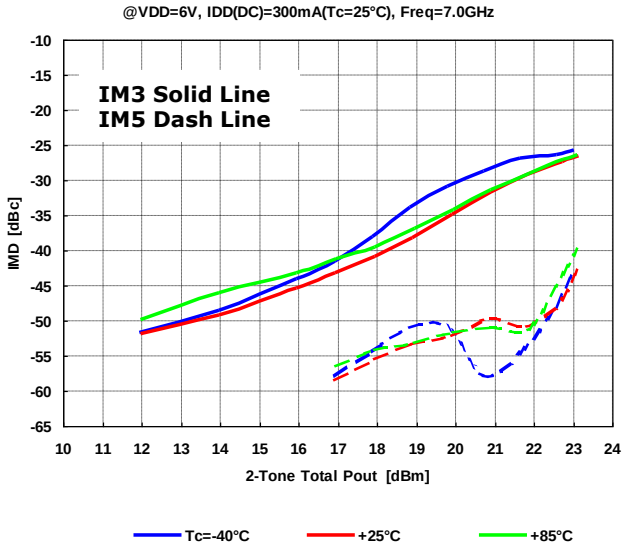
IMD Performance vs. Output Power by Temperature



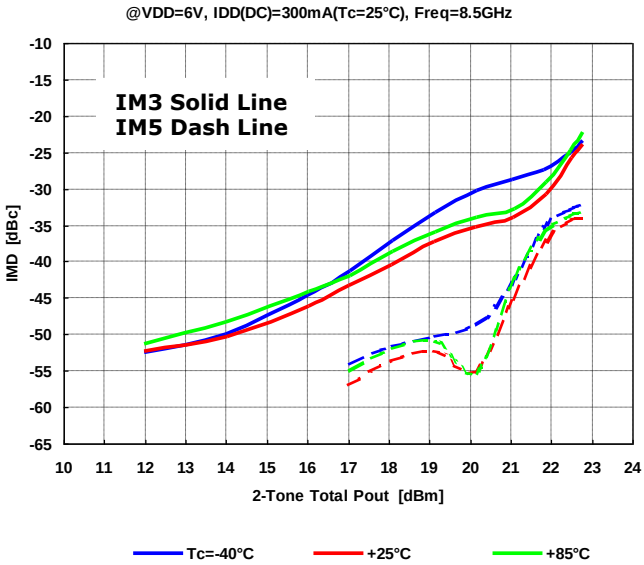
IMD Performance vs. Output Power by Temperature



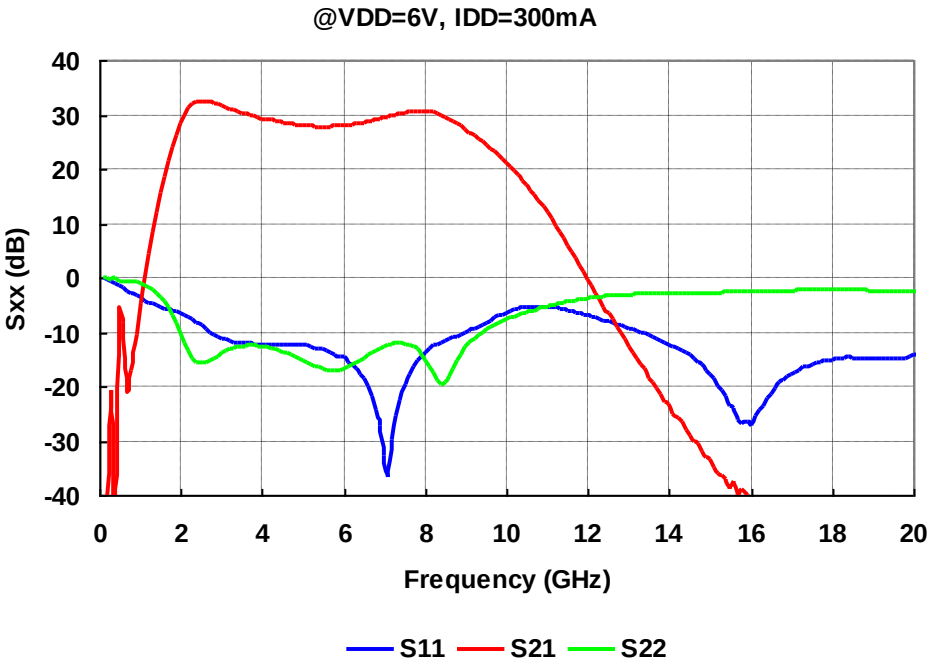
IMD Performance vs. Output Power by Temperature

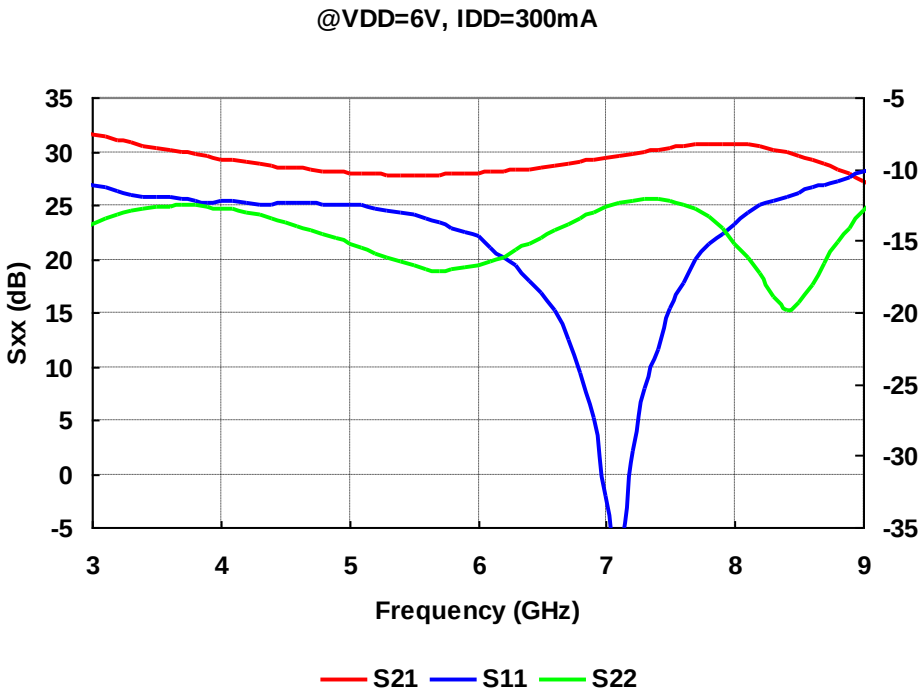


IMD Performance vs. Output Power by Temperature

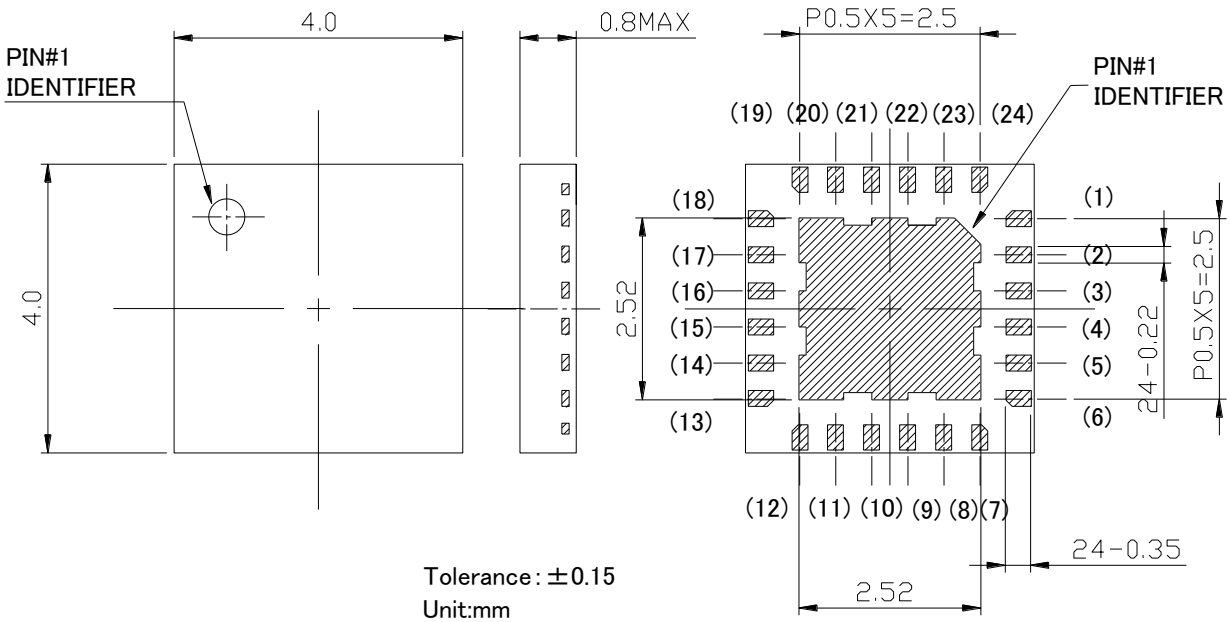


● S-Parameter


@VDD=6V, IDD=300mA
Sxx (dB)
40
30
20
10
0
-10
-20
-30
-40
0
2
4
6
8
10
12
14
16
18
20
Frequency (GHz)
S11
S21
S22


@VDD=6V, IDD=300mA
Sxx (dB)
35
30
25
20
15
10
5
0
-5
-5
-10
-15
-20
-25
-30
-35
3
4
5
6
7
8
9
Frequency (GHz)
S21
S11
S22

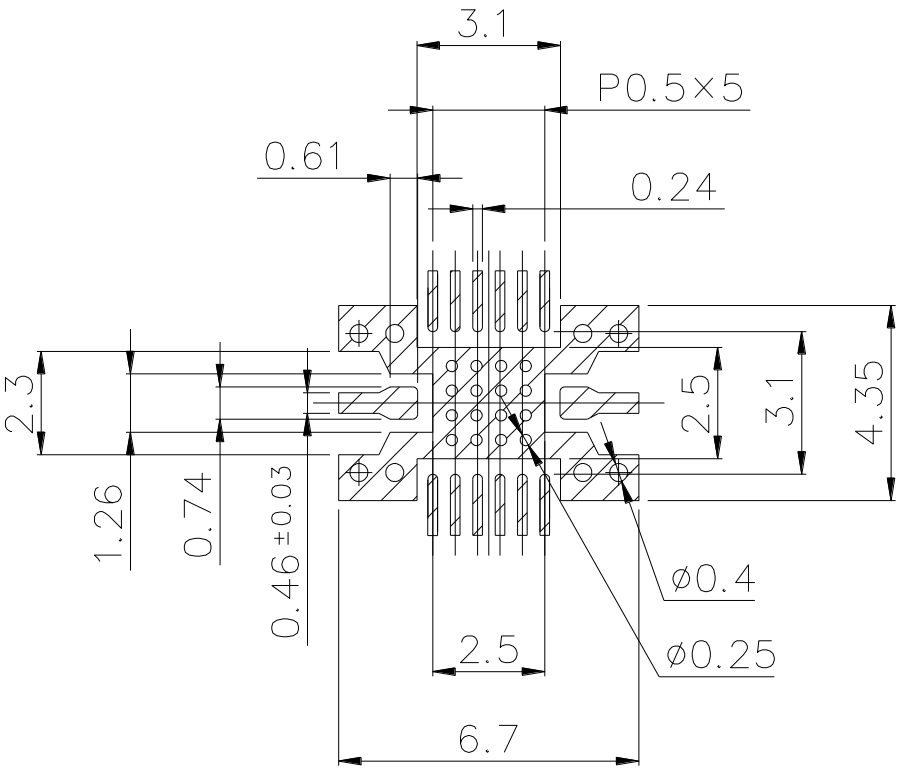
- **Package Out line**



PIN Assignment

RF IN : 3,4
RF OUT : 15,16
VGG1 : 24 VDD1 : 7
VGG2 : 22 VDD2 : 9
VGG3 : 20 VDD3 : 11
N/C : 1,2,5,6,8,10,12,13,14,17,18,19,21,23

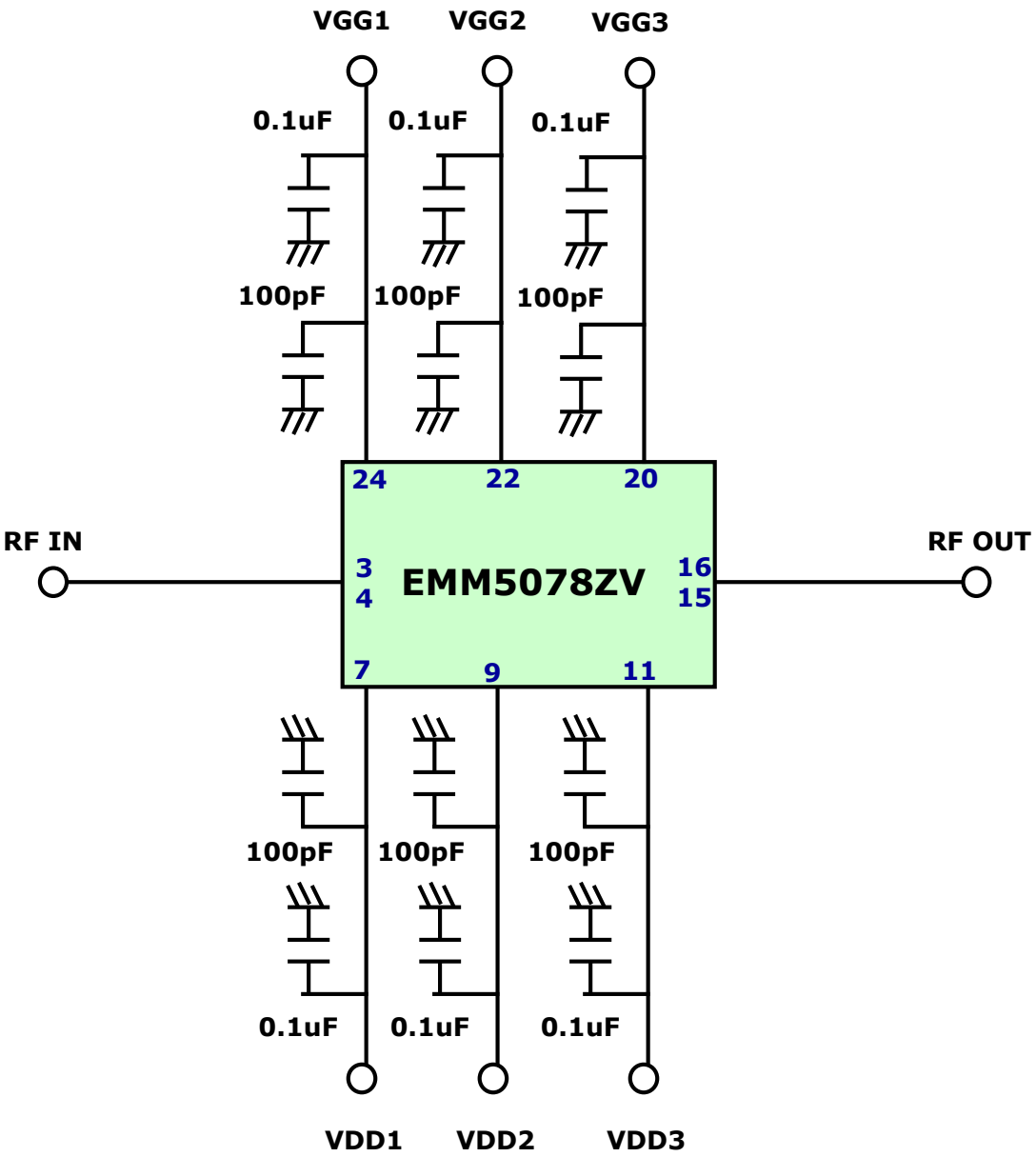
- **PCB Pads and Solder-Resist Pattern**



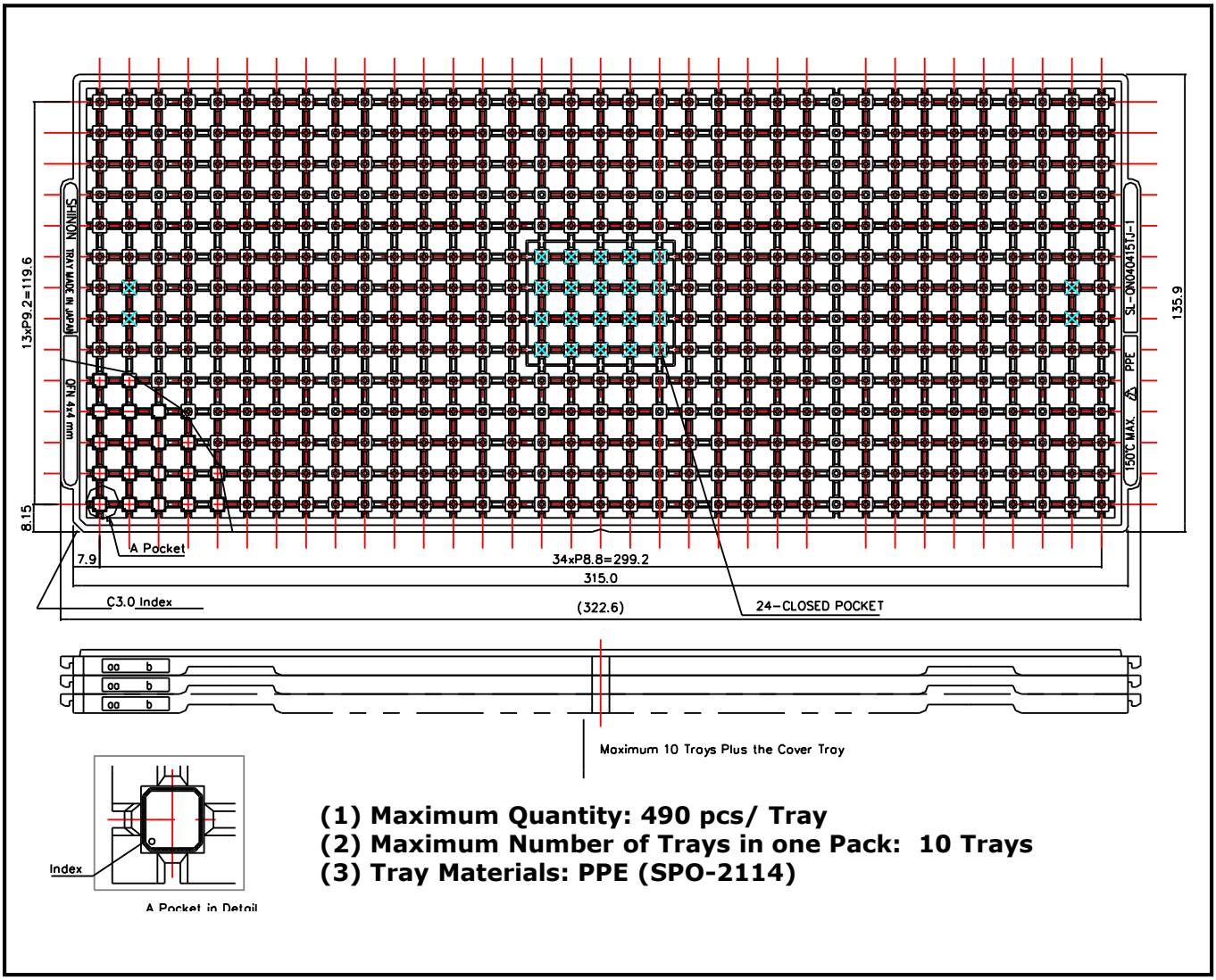
Unit : mm

Notes :
1.LAMINATE : Rogers Corporation RO4003, Thickness t=0.2mm, Cu Foil 18μm
Finish to copper foil ; Ni 0.1μm min./Au 0.1±0.08μm (Both side)

- **Recommended Bias Network**

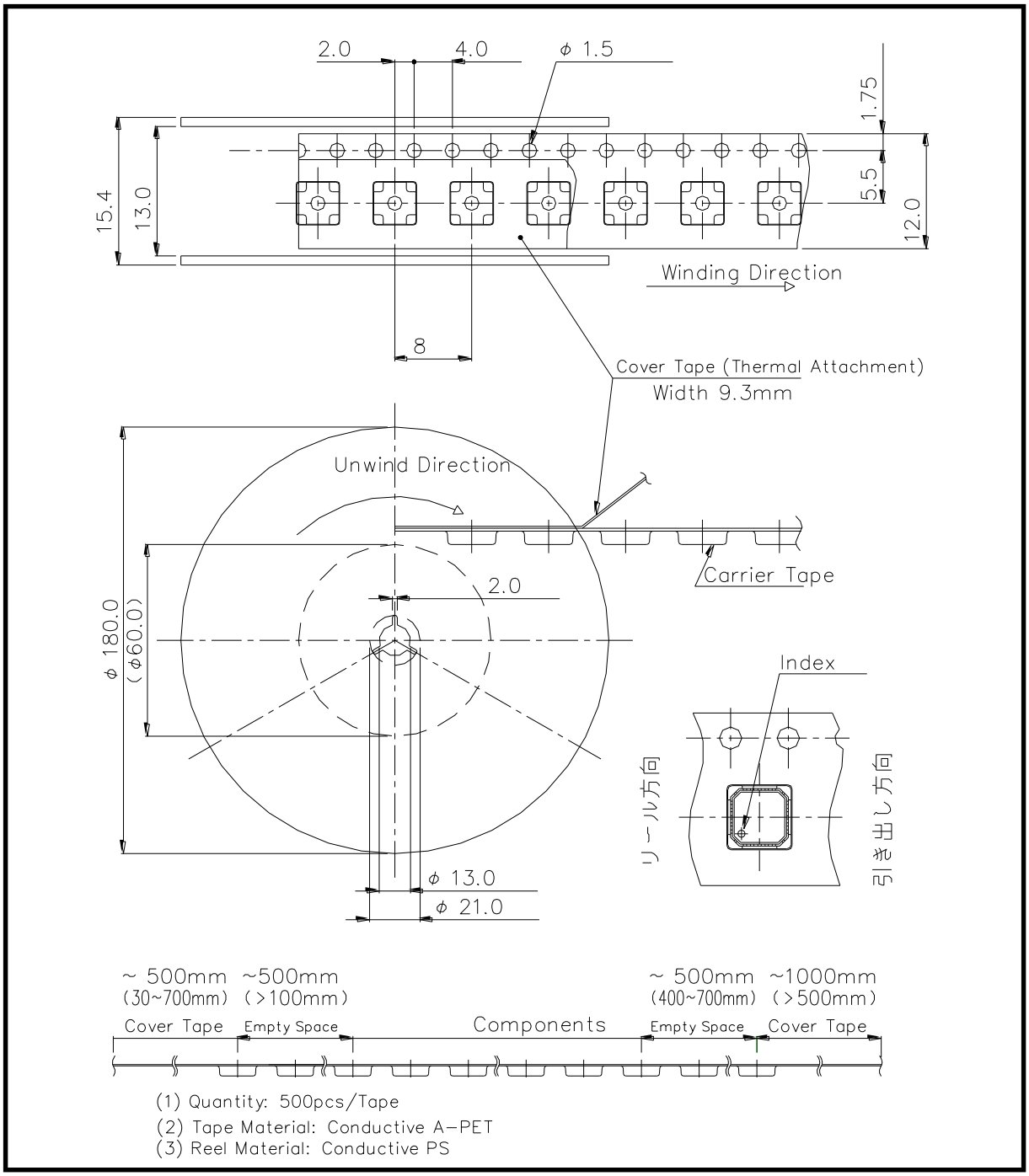


● JDEC Tray Packing (Part No. : EMM5078ZV)



(1) Maximum Quantity: 490 pcs/ Tray
(2) Maximum Number of Trays in one Pack: 10 Trays
(3) Tray Materials: PPE (SPO-2114)

● Tape and Reel Packing (Part No. : EMM5078ZVT)



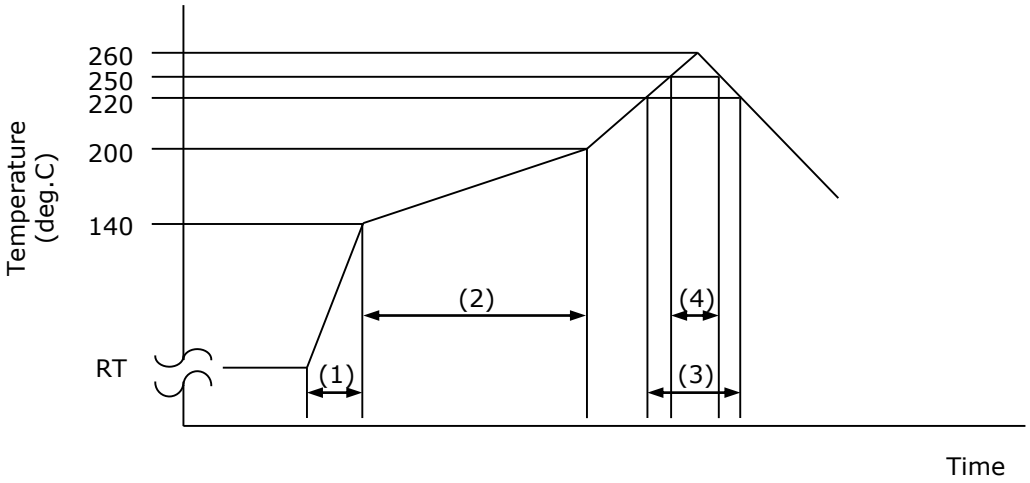
● Mounting Method of SMD(Surface Mount Devices) for Lead-free solder

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: 3 deg.C/seconds
(2) Preheating: 150 to 200 deg.C, 60 to 180 seconds
(3) Main heating: 220 deg.C, 60 seconds max.
(4) Peak Temperature: 260 deg.C max., more than 250 deg.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 Safety, Observe the Following Procedures Environmental Management

- Do not put this product 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.
- Respect all applicable laws of the country when discarding this product.
  This product must be disposed in accordance with methods specified by applicable hazardous waste procedures.

Any information, such as descriptions of a function and examples of application circuits, in this document are presented solely as a reference for the purpose to show examples of operations and uses of Sumitomo Electric semiconductor device(s); Sumitomo Electric does not warrant the proper operation of the device(s) with respect to its use based on such information. When the user develops equipment incorporating the device(s) based on such information, they must assume full responsibility arising out of using such information. Sumitomo Electric assumes no liability for any damages whatsoever arising out of the use of the information.

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