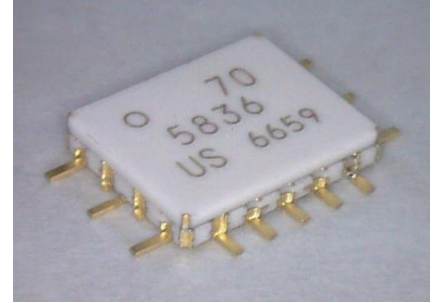


FEATURES

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

DESCRIPTION

The EMM5836V1B is a MMIC amplifier that contains a four-stages amplifier, internally matched, for standard communications band in the 17.7 to 19.7GHz 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}	23	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}	=<14	dBm
Operating Case Temperature	T _C	-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	17.7	-	19.7	GHz
Gate Bias Voltage	V _{GG(DC)}	IDD(DC)=1400mA typ.	-0.50	-0.15	-0.01	V
Output Power at Pin=13dBm	P _{OUT}	Vgg-Const. Zs=Zl=50ohm * : df=+10MHz Pout=20.0dBm (S.C.L.)	31.5	33.5	-	dBm
Output Power at 1dB G.C.P.	P _{1dB}		-	32.5	-	dBm
Power Gain at 1dB G.C.P.	G _{1dB}		22	26	-	dB
Power-added Efficiency at 1dB G.C.P.	PAE		-	16	-	%
Third Order Intermodulation Distortion*	IM3		-37	-40	-	dBc
Drain Current at 1dB G.C.P.	I _{DD(RF)}		-	1800	2200	mA
Input Return Loss at Pin=-20dBm	RL _{IN}		-	12	-	dB
Output Return Loss at Pin=-20dBm	RL _{OUT}		-	8	-	dB

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

ESD	Class 0	=< 250V
-----	---------	---------

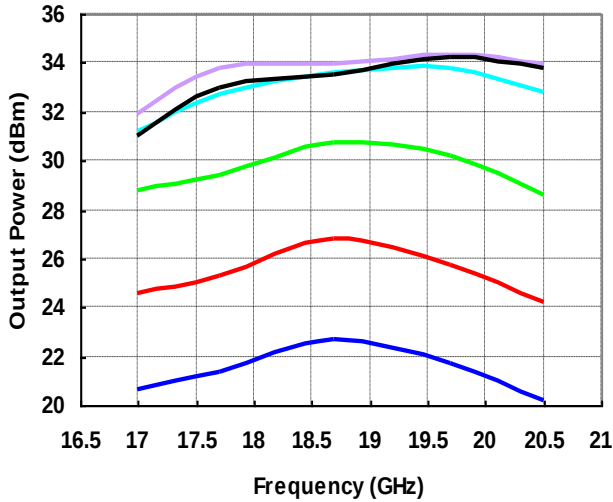
Note : Based on JEDEC JESD22-A114C (C=100pF, R=1.5kohm)

CASE STYLE	V1B
RoHS COMPLIANCE	YES

ORDERING INFORMATION

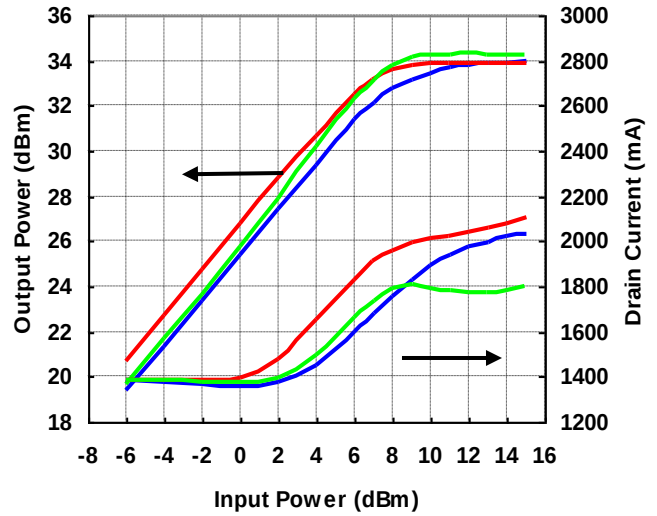
Part Number	Order Unit	Packing
EMM5836V1B	No Limitation	48 pcs./Tray × 4 Tray = 192 pcs./Packing
EMM5836V1BT	500pcs.	500 pcs./Reel × 1 Reel = 500 pcs./Packing

Frequency vs. Output Power
($V_{DD}=6V$, $I_{DD(DC)}=1400mA$, $T_c=+25deg.C$)



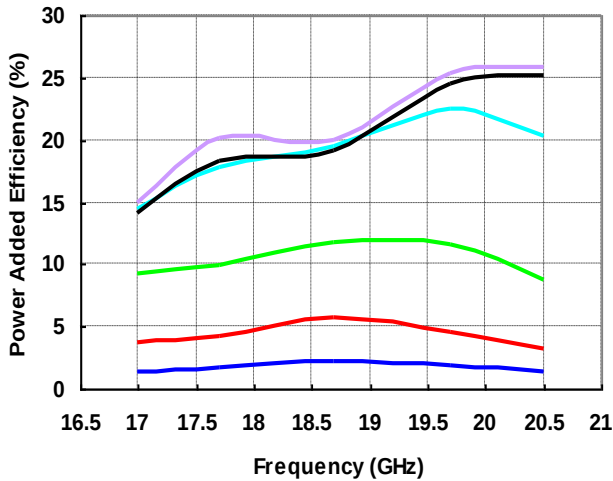
— Pin=-4dBm — 0dBm — +4dBm
— +8dBm — +12dBm — P1dB

Input Power vs. Output Power, Idsr
($V_{DD}=6V$, $I_{DD(DC)}=1400mA$, $T_c=+25deg.C$)



— 17.7GHz — 18.7GHz — 19.7GHz

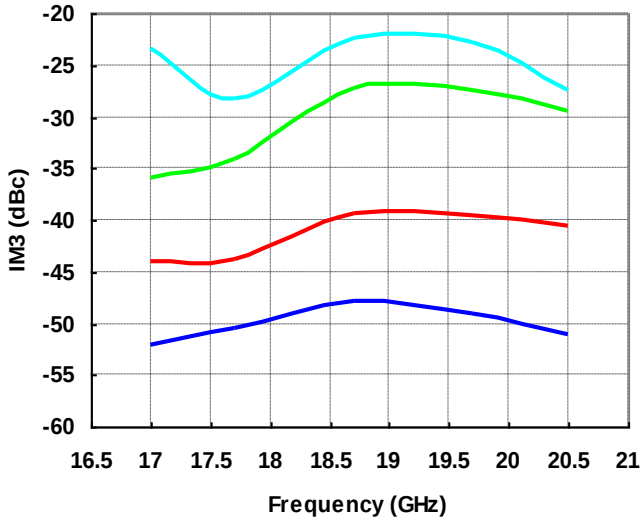
Frequency vs. Power Added Efficiency
($V_{DD}=6V$, $I_{DD(DC)}=1400mA$, $T_c=+25deg.C$)



— Pin=-4dBm — 0dBm — +4dBm
— +8dBm — +12dBm — P1dB

Frequency vs. IMD

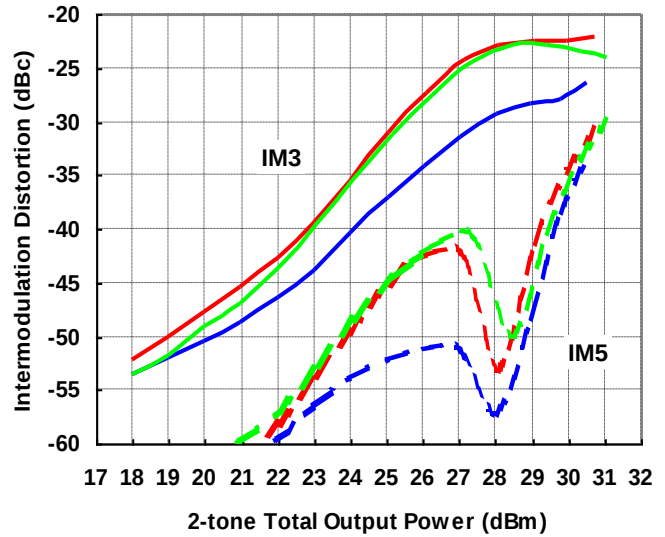
($V_{DD}=6V$, $I_{DD(DC)}=1400mA$, $T_c=+25deg.C$)



— Pout(S.C.L.)=17dBm — 20dBm — 23dBm — 26dBm

Output Power vs. IMD

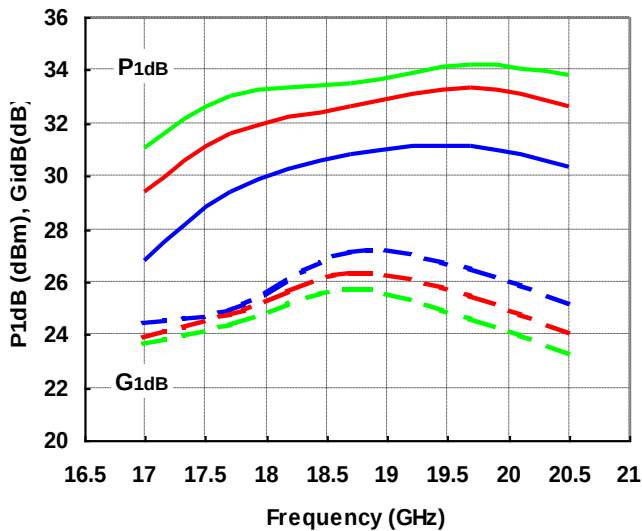
($V_{DD}=6V$, $I_{DD(DC)}=1400mA$, $T_c=+25deg.C$)



— 17.7GHz — 18.7GHz — 19.7GHz

Frequency vs. P_{1dB} , G_{1dB} by Drain Voltage

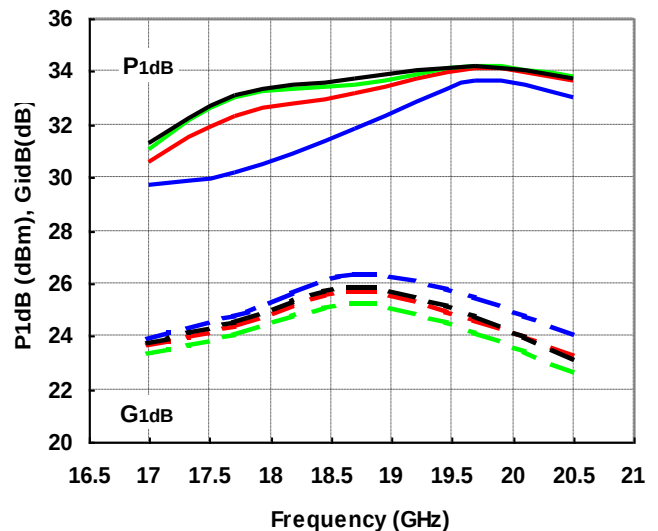
($I_{DD(DC)}=1400mA$, $T_c=+25deg.C$)



— $V_{DD}=4V$ — 5V — 6V

Frequency vs. P_{1dB} , G_{1dB} by Drain Voltage

($V_{DD}=6V$, $T_c=+25deg.C$)



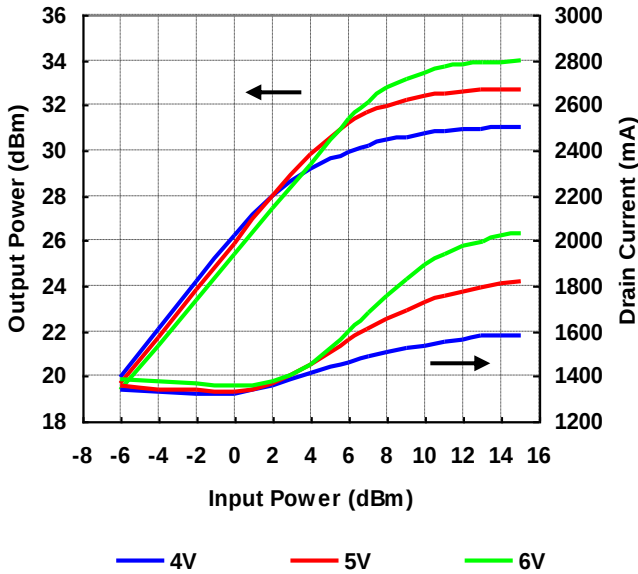
— 1000mA — 1200mA — 1400mA — 1600mA

Input Power vs. Output Power, I_{dsr} by Drain Voltage

($I_{DD(DC)}=1400mA$, $T_c=+25deg.C$)

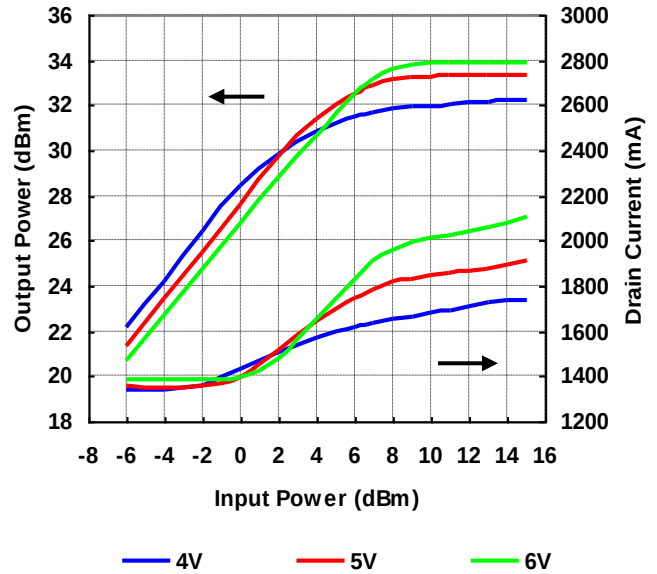
Output Power, Drain Current vs. Input Power
by Drain Voltage

@ $I_{DD(DC)}=1400mA$, Freq.=17.7GHz



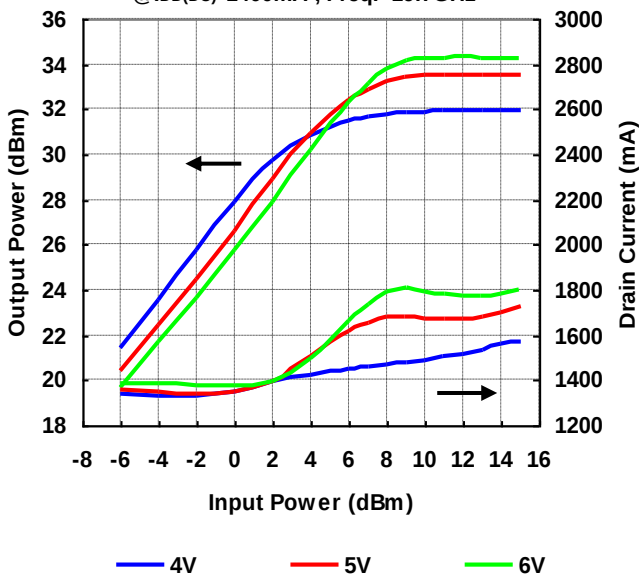
Output Power, Drain Current vs. Input Power
by Drain Voltage

@ $I_{DD(DC)}=1400mA$, Freq.=18.7GHz



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

@ $I_{DD(DC)}=1400mA$, Freq.=19.7GHz

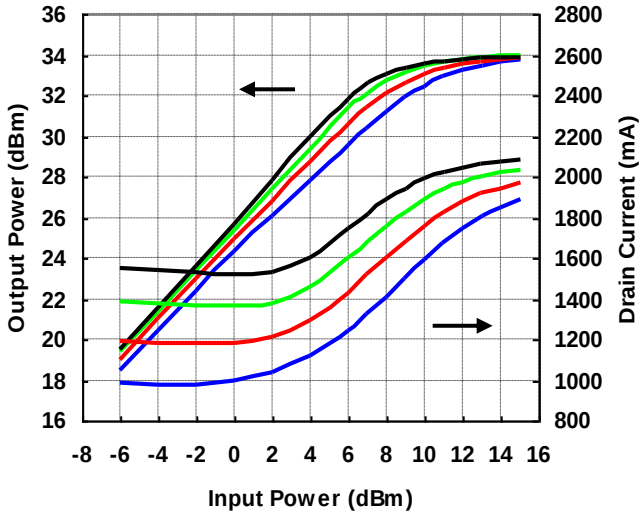


Input Power vs. Output Power, Idsr by Drain Current

($V_{DD}=6V$, $T_c=+25\text{deg.C}$)

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

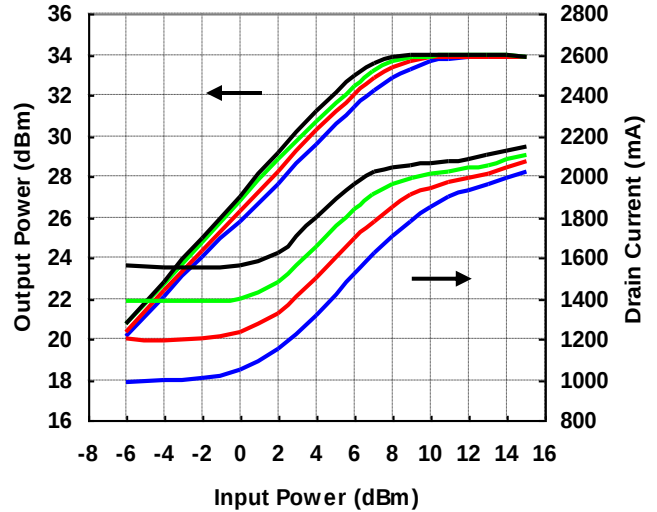
@ $V_{DD}=6V$, Freq.=17.7GHz



— 1000mA — 1200mA — 1400mA — 1600mA

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

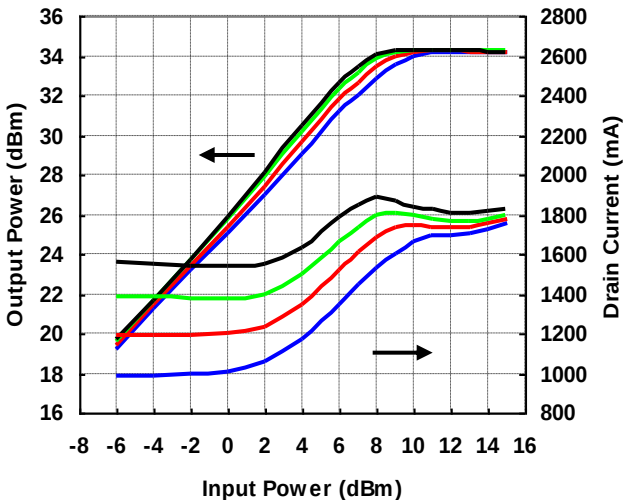
@ $V_{DD}=6V$, Freq.=18.7GHz



— 1000mA — 1200mA — 1400mA — 1600mA

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

@ $V_{DD}=6V$, Freq.=19.7GHz



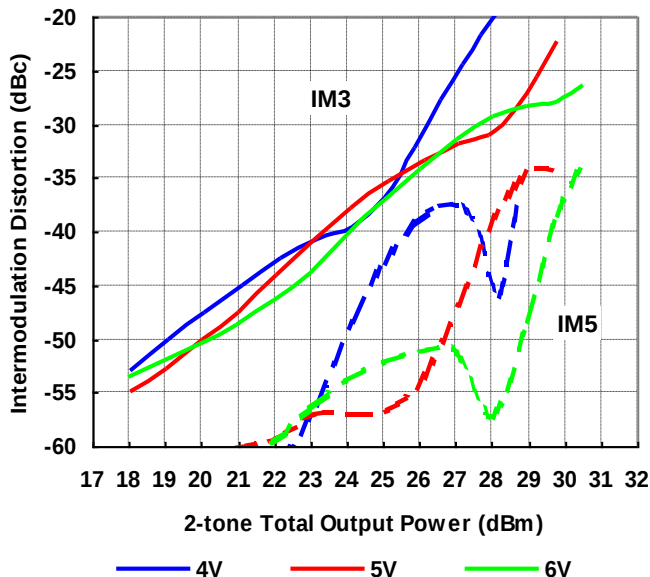
— 1000mA — 1200mA — 1400mA — 1600mA

Output Power vs. IMD by Drain Voltage

($I_{DD(DC)}=1400\text{mA}$, $T_c=+25\text{deg.C}$)

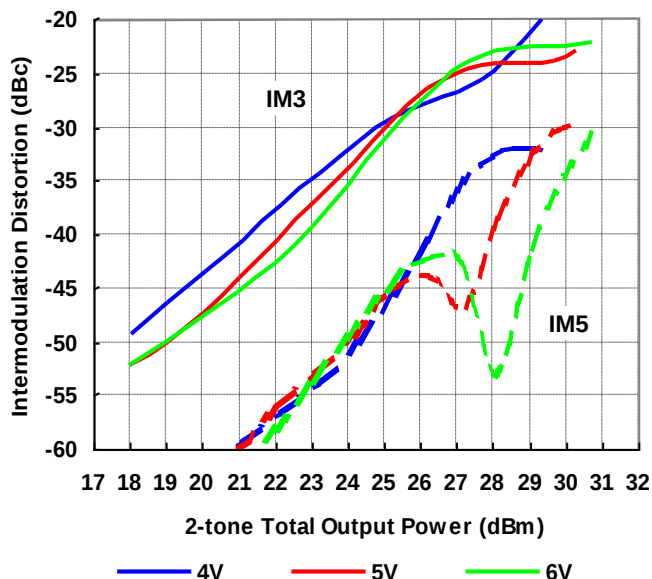
IMD Performance vs. Output Power by Drain Voltage

@ $I_{DD(DC)}=1400\text{mA}$, Freq.=17.7GHz



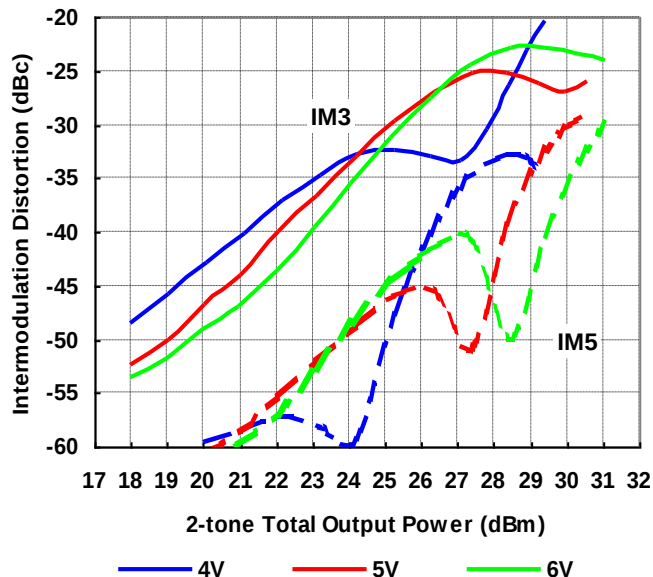
IMD Performance vs. Output Power by Drain Voltage

@ $I_{DD(DC)}=1400\text{mA}$, Freq.=18.7GHz



IMD Performance vs. Output Power by Drain Voltage

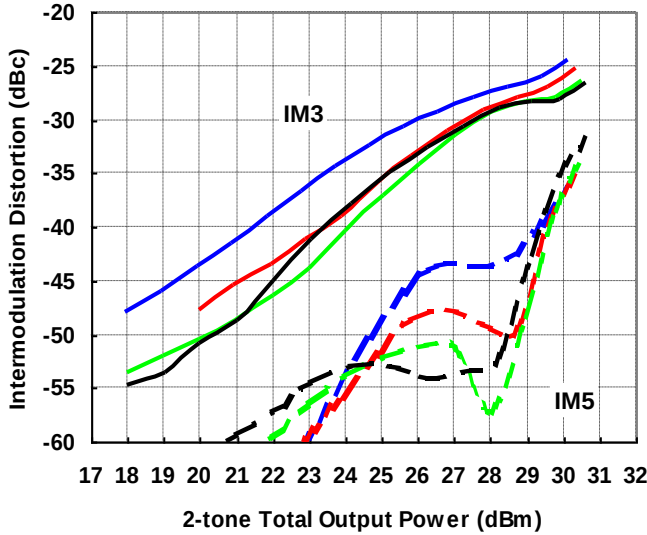
@ $I_{DD(DC)}=1400\text{mA}$, Freq.=19.7GHz



Output Power vs. IMD by Drain Current ($V_{DD}=6V$, $T_c=+25deg.C$)

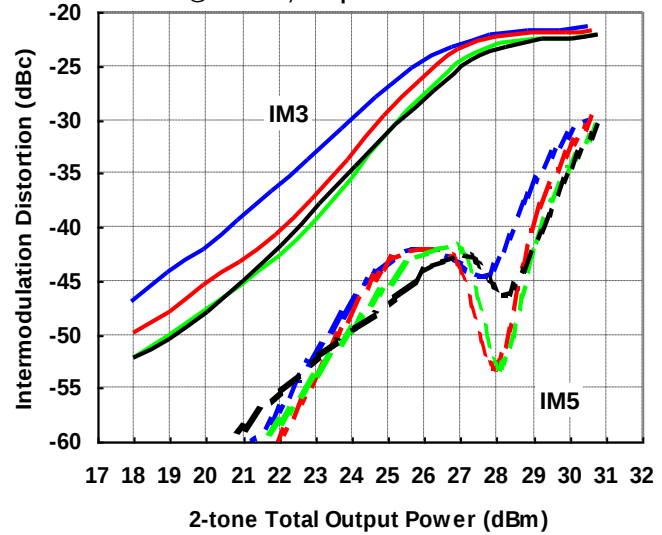
IMD Performance vs. Output Power
by Drain Current

@ $V_{DD}=6V$, Freq.=17.7GHz



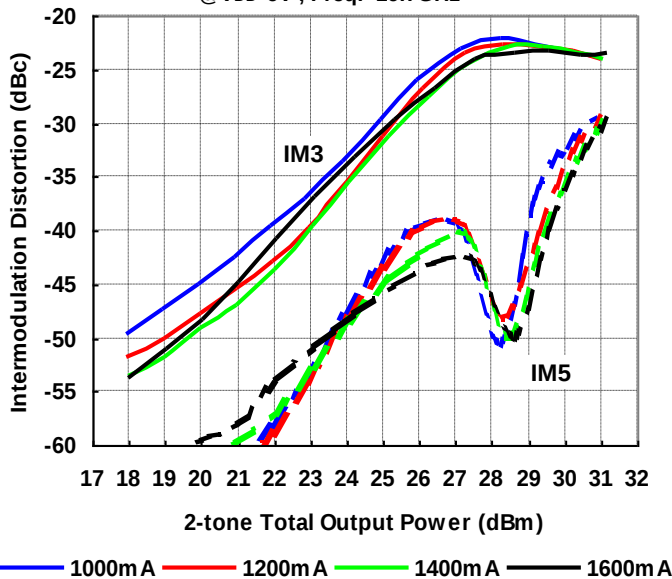
IMD Performance vs. Output Power
by Drain Current

@ $V_{DD}=6V$, Freq.=18.7GHz



IMD Performance vs. Output Power
by Drain Current

@ $V_{DD}=6V$, Freq.=19.7GHz

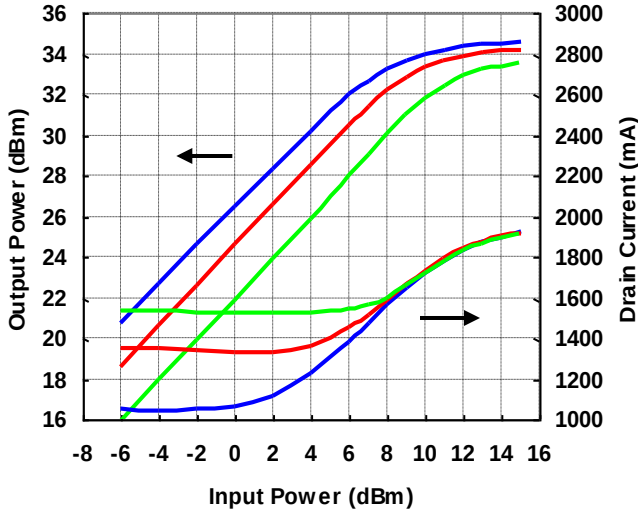


Input Power vs. Output Power by Temperature

($V_{DD}=6V$, $I_{DD(DC)}=1400mA$)

Output Power, Drain Current vs. Input Power by Temperature

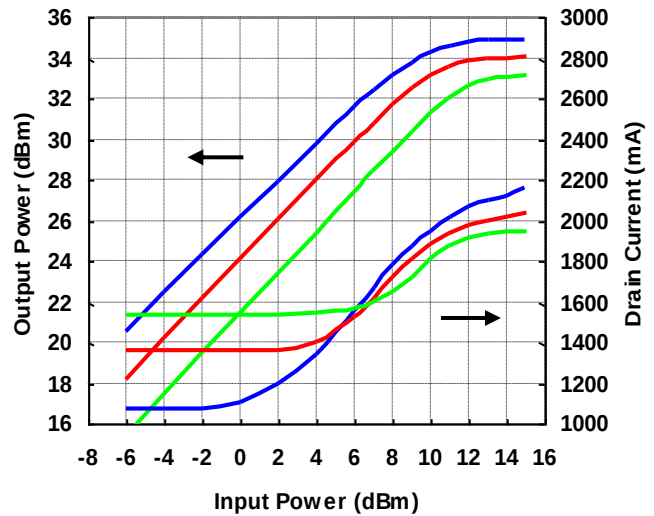
@ $V_{DD}=6V$, $I_{DD(DC)}=1400mA$ (@ $T_c=+25deg.C$)
Freq.=17.7GHz



— -40deg.C — +25deg.C — +85deg.C

Output Power, Drain Current vs. Input Power by Temperature

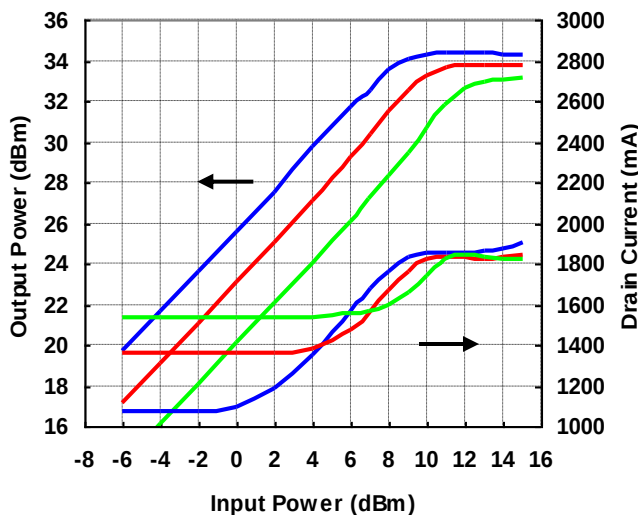
@ $V_{DD}=6V$, $I_{DD(DC)}=1400mA$ (@ $T_c=+25deg.C$)
Freq.=18.7GHz



— -40deg.C — +25deg.C — +85deg.C

Output Power, Drain Current vs. Input Power by Temperature

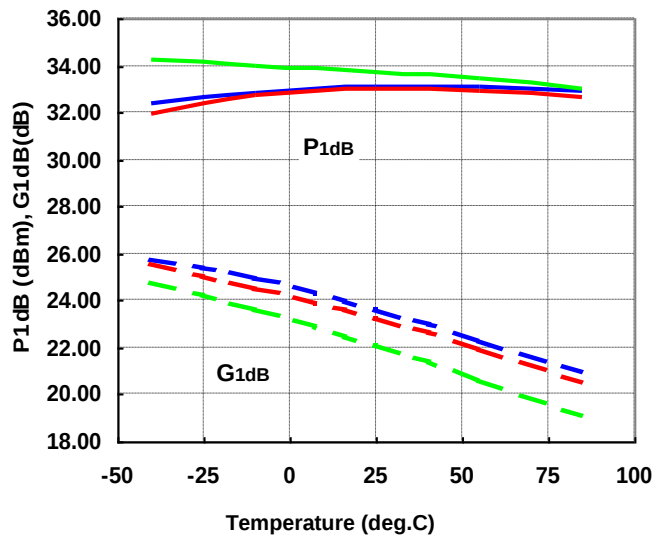
@ $V_{DD}=6V$, $I_{DD(DC)}=1400mA$ (@ $T_c=+25deg.C$)
Freq.=19.7GHz



— -40deg.C — +25deg.C — +85deg.C

P1dB, G1dB s. Temperature

@ $V_{DD}=6V$, $I_{DD(DC)}=1400mA$ (@ $T_c=+25deg.C$)



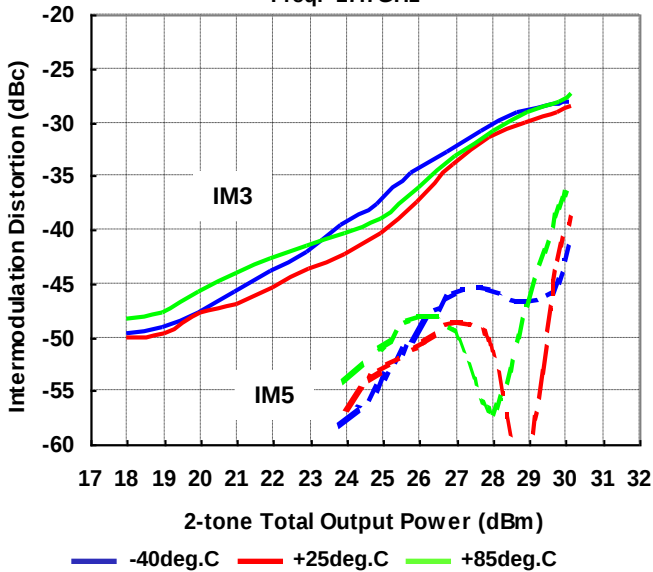
— 17.7GHz — 18.7GHz — 19.7GHz

Output Power vs. IMD by Temperature

($V_{DD}=6V$, $I_{DD(DC)}=1400mA$)

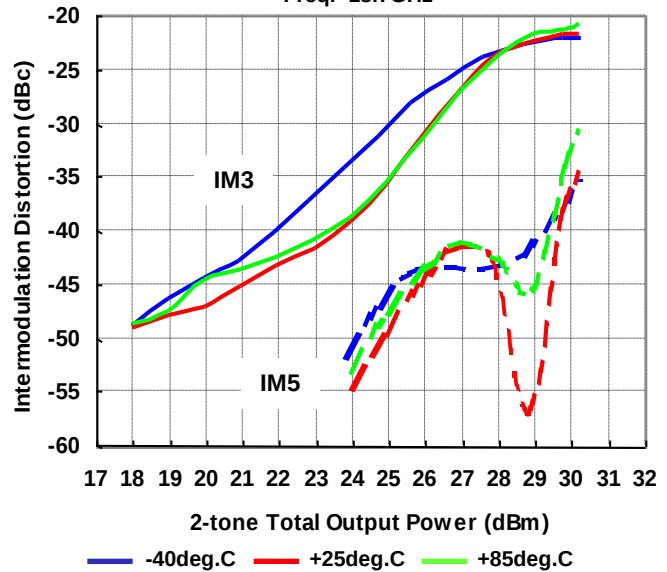
IMD Performance vs. Output Power by Temperature

@ $V_{DD}=6V$, $I_{DD(DC)}=1400mA$ (@ $T_c=+25deg.C$)
Freq.=17.7GHz



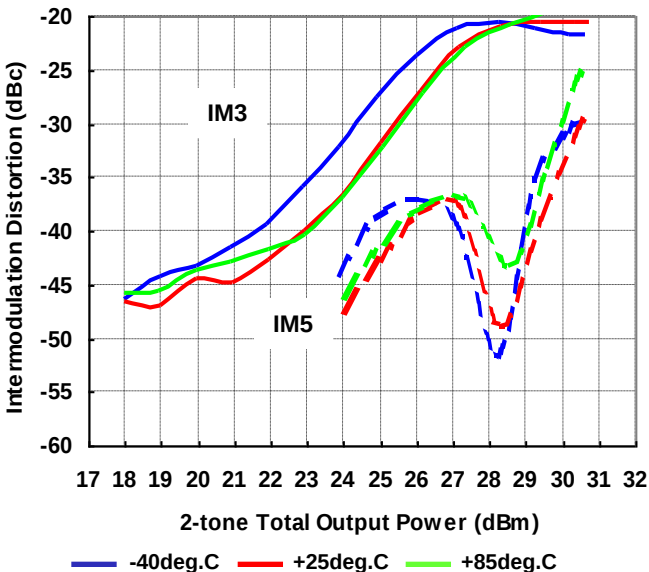
IMD Performance vs. Output Power by Temperature

@ $V_{DD}=6V$, $I_{DD(DC)}=1400mA$ (@ $T_c=+25deg.C$)
Freq.=18.7GHz



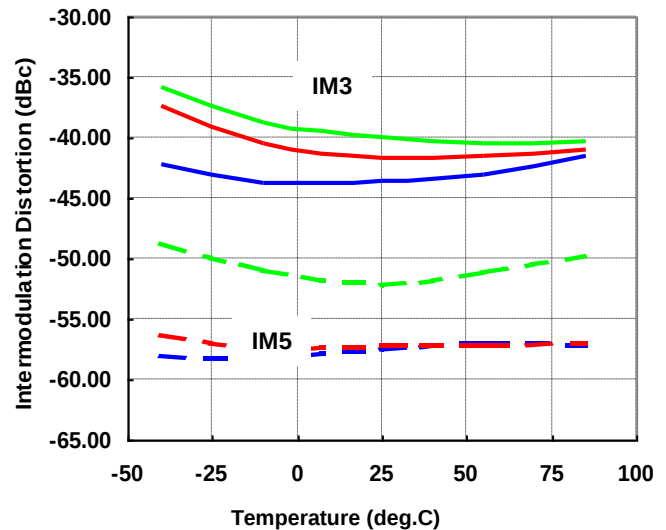
IMD Performance vs. Output Power by Temperature

@ $V_{DD}=6V$, $I_{DD(DC)}=1400mA$ (@ $T_c=+25deg.C$)
Freq.=19.7GHz



IMD vs. Temperature

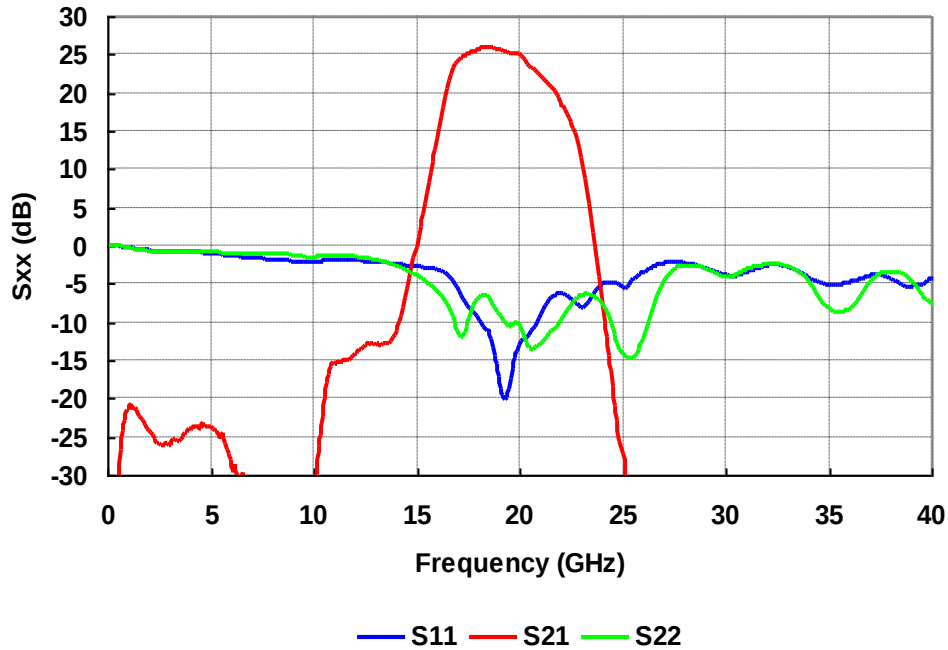
@ $V_{DD}=6V$, $I_{DD(DC)}=1400mA$ (@ $T_c=+25deg.C$)
 $P_{out}=20dBm$ (S.C.L.)



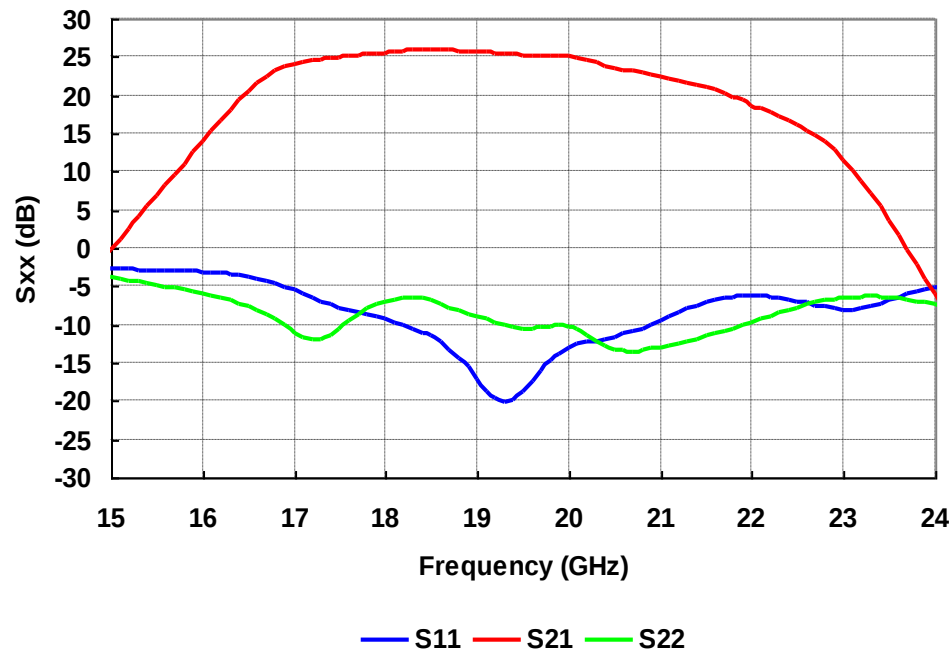
S-parameter

($V_{DD}=6V$, $I_{DD(DC)}=1400mA$, $T_c=+25deg.C$)

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

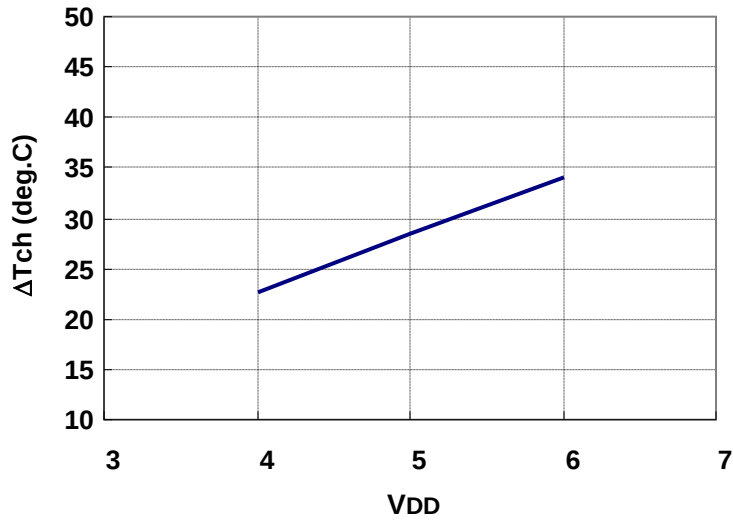


@VDD=6V , IDD(DC)=1400mA



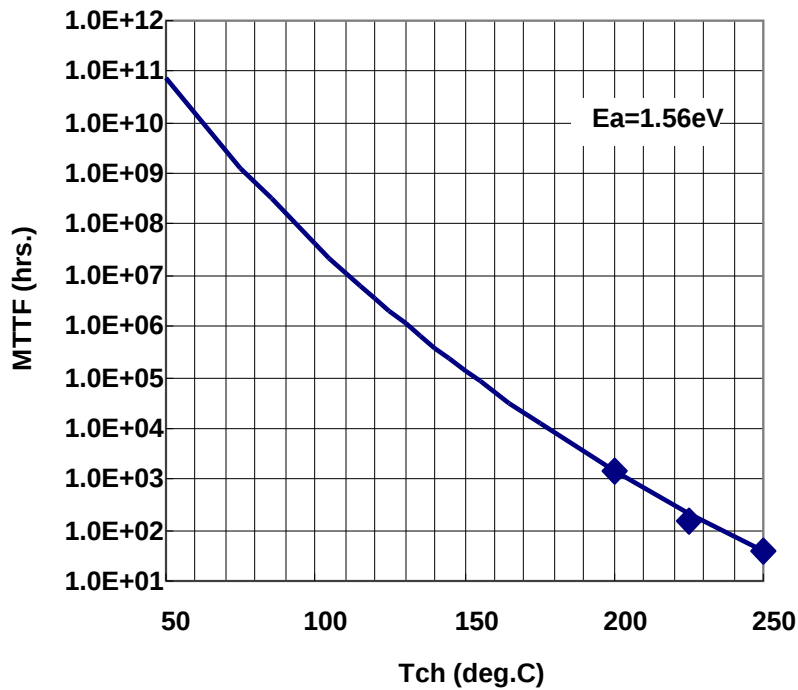
ΔT_{ch} vs. Drain Voltage
(Reference)

$I_{DD}(DC)=1400mA$

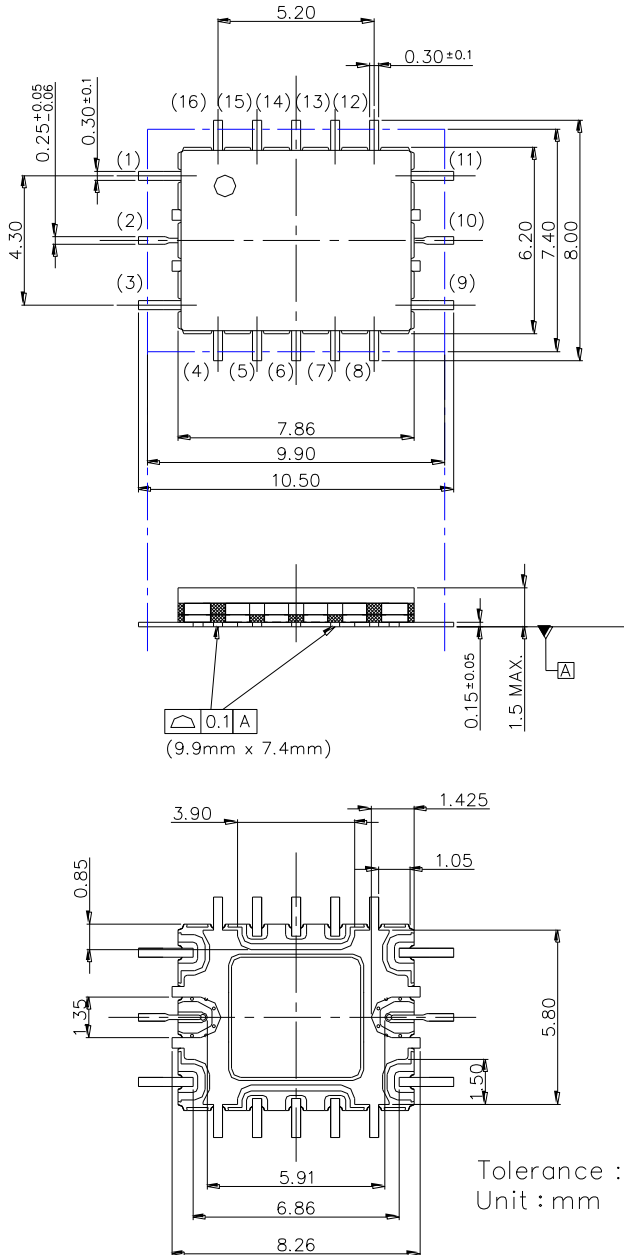


Note: ΔT_{ch} : Temperature Rise from Backside of the Package to Channel.

MTTF vs. T_{ch}



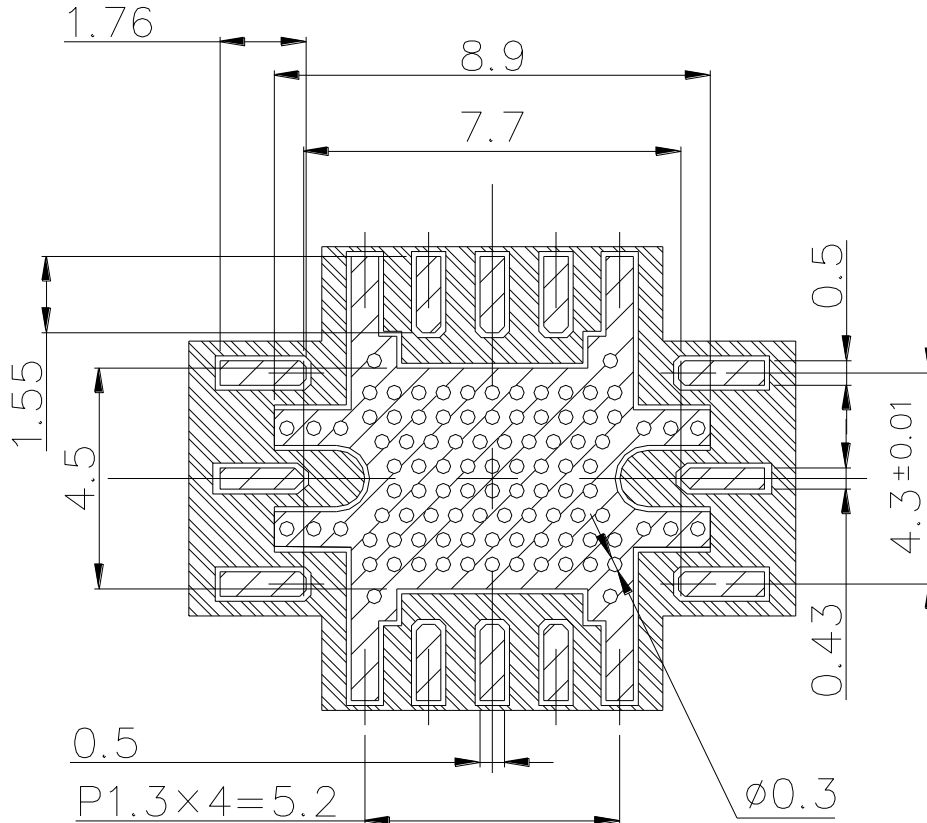
■ Package Outline and Pin Assignment



PIN Assignment

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

■ PCB Pads and Solder-resist Pattern

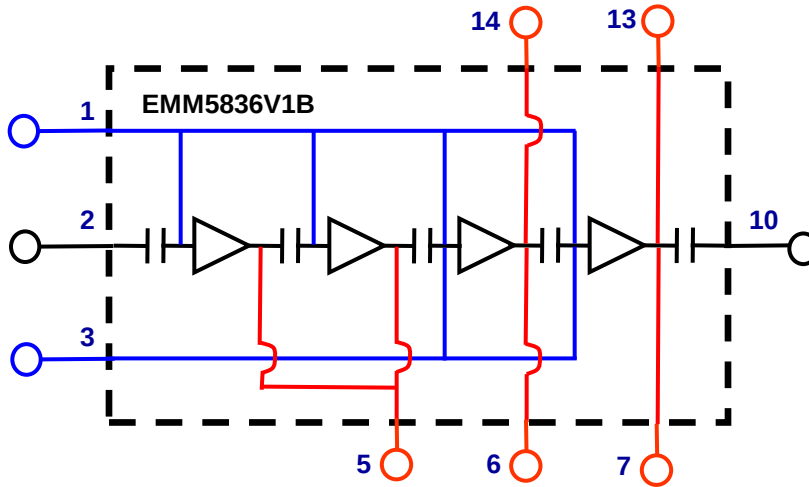


NOTES.

- 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

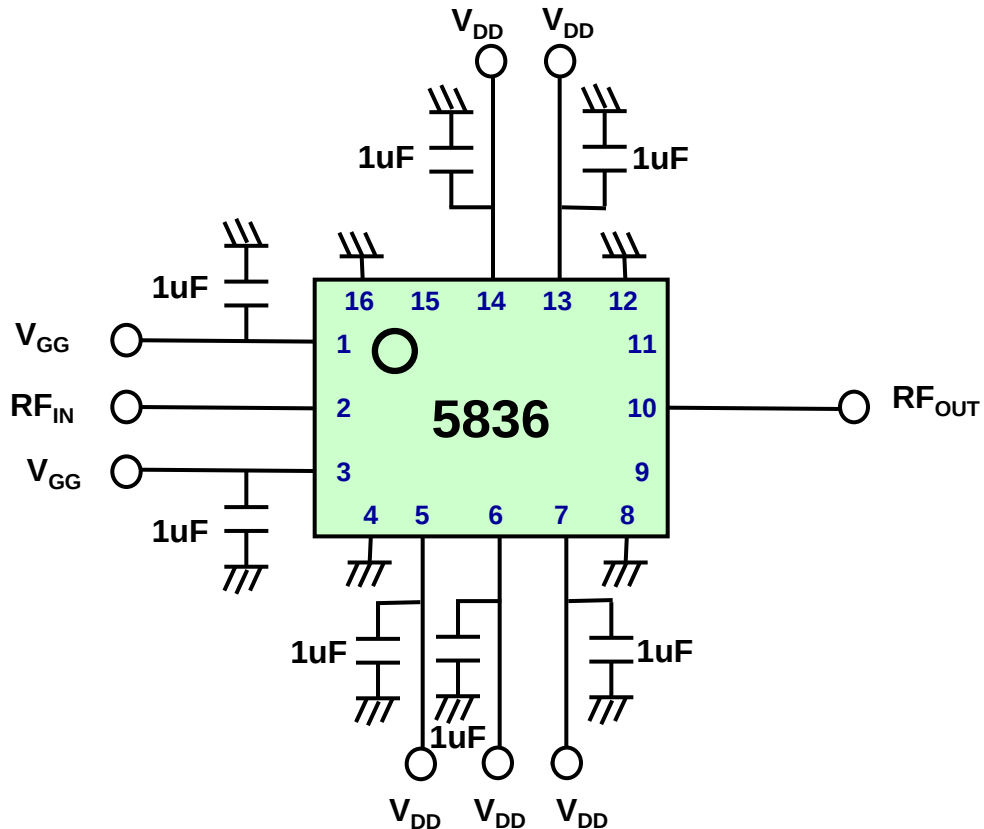
Block Diagram



PIN Assignment

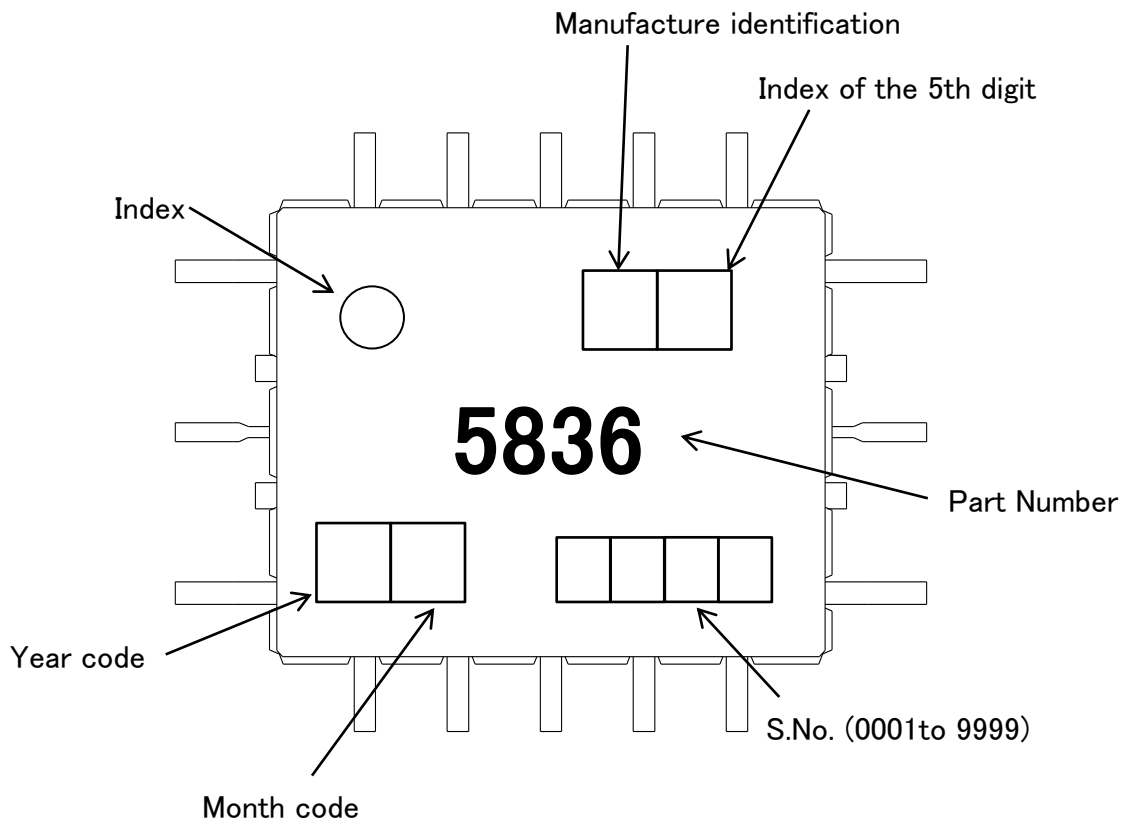
V_{GG} : 1, 3
 V_{DD} : 5, 6, 7, 13, 14
 RF_{IN} : 2
 RF_{OUT} : 10
 GND : 4, 8, 12, 16
 $N.C.$: 9, 11, 15

Recommended Bias Network



NOTE: All the V_{DD} and V_{GG} should be biased.

■ Marking Information



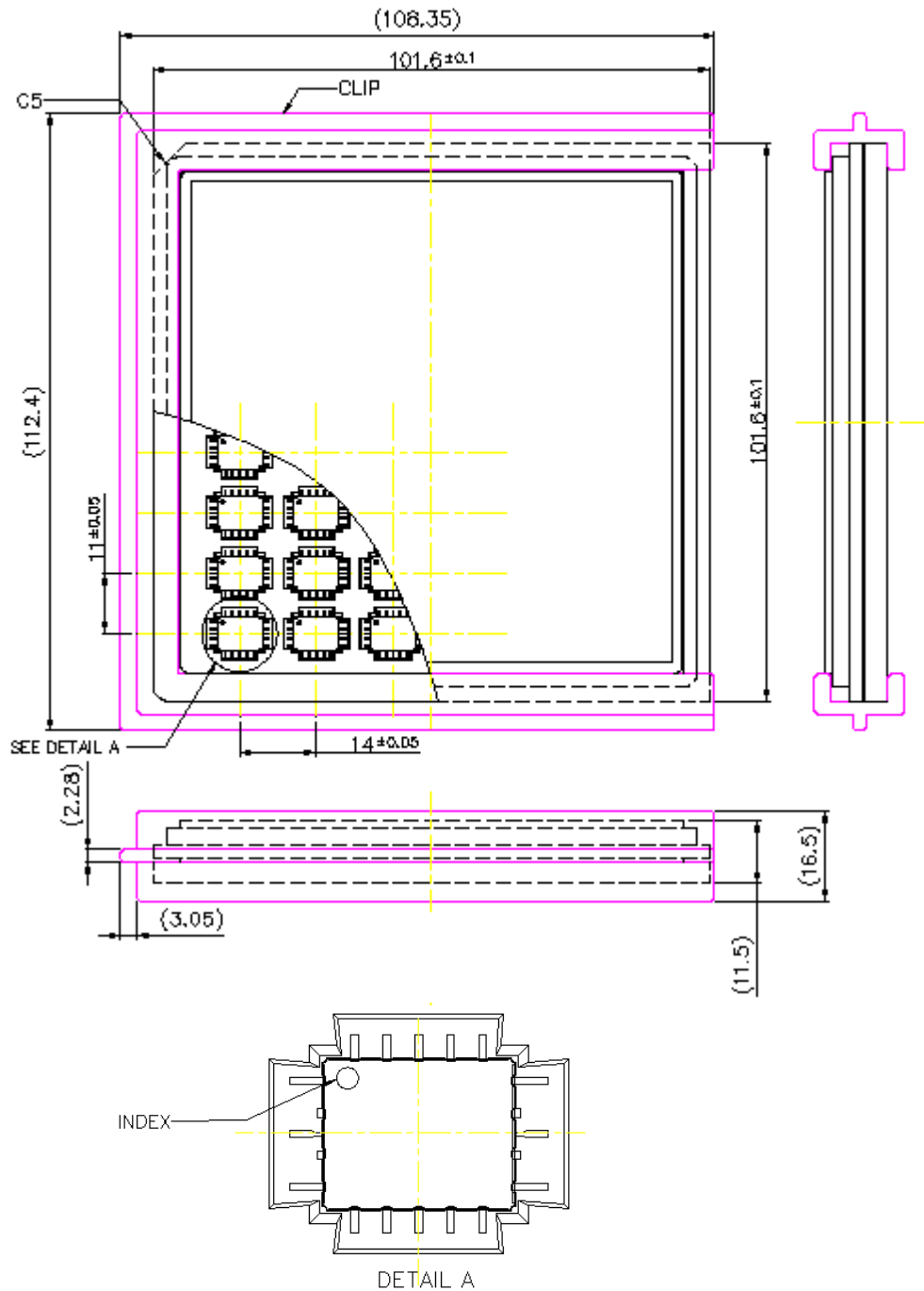
<Year code>

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

<Month code>

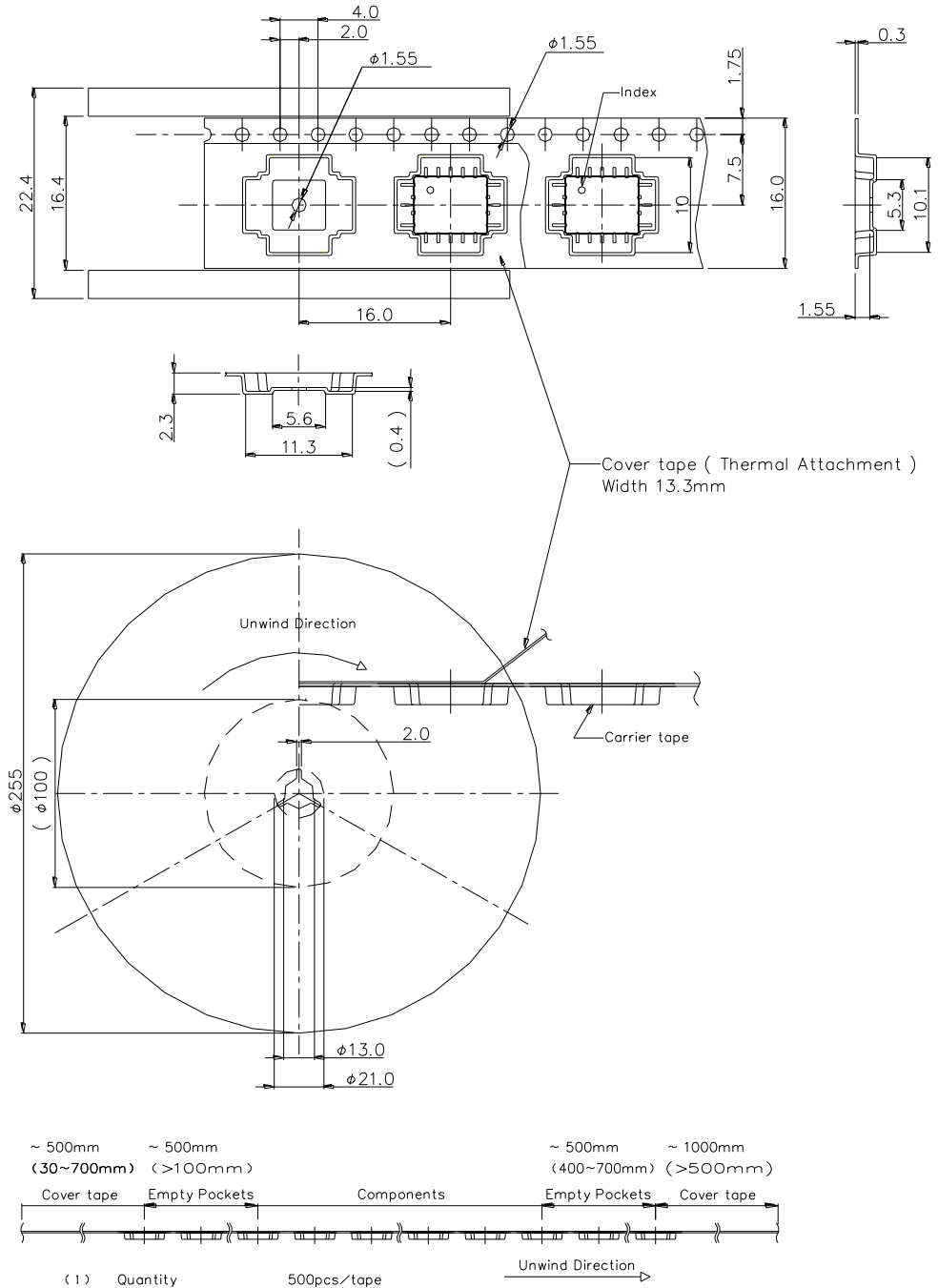
Code	H	M	N	P	R	S	T	U	W	X	Y	Z
Month	1	2	3	4	5	6	7	8	9	10	11	12

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



(1) Maximum Quantity : 48pcs. / Tray

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



■ 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.)

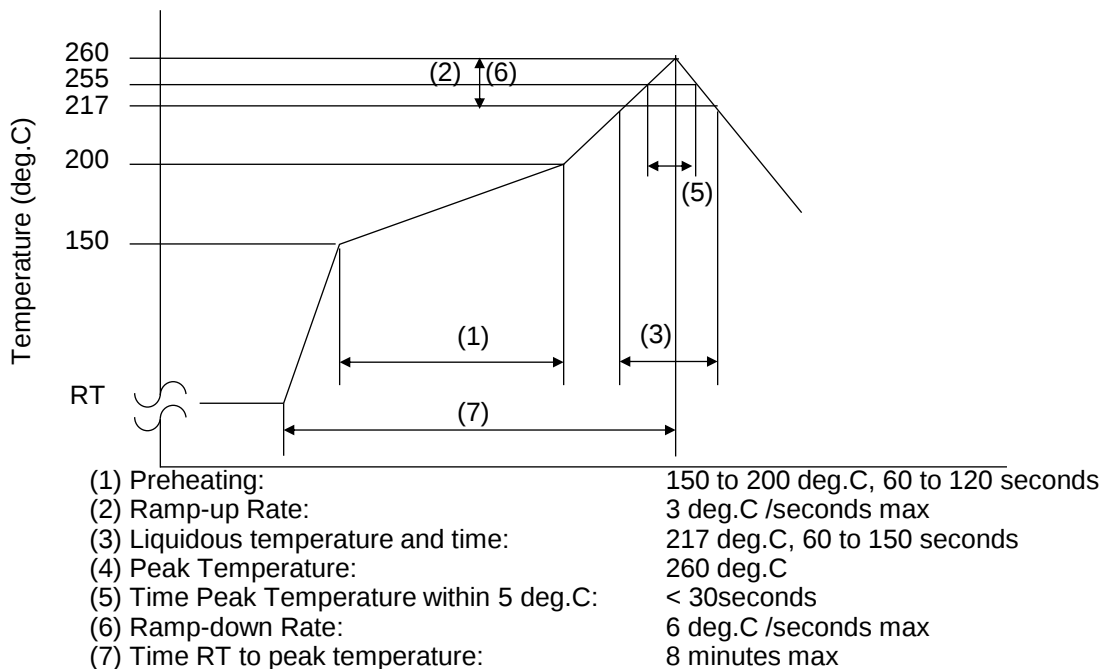
(2) A rosin type flux with a chlorine content of 0.2% or less shall be used. The rosin flux with low halogen content is recommended.

(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:



* 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.

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.