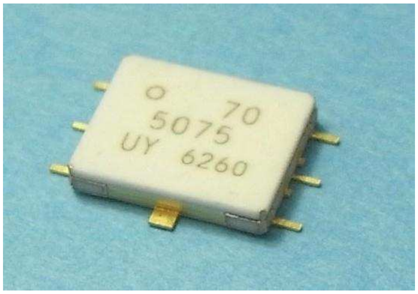
EMM5075VU

Ku-Band Power Amplifier MMIC



FEATURES

- High Output Power: Pout=33.0dBm (typ.)
- High Linear Gain: GL=26.0dB (typ.)
- Broad Band: 12.7 to 15.4GHz
- Impedance Matched Zin/Zout=50ohm
- Small Hermetic Metal-Ceramic SMT Package(VU)

DESCRIPTION

The EMM5075VU is a MMIC amplifier that contains a three-stages amplifier, internally matched, for standard communications band in the 12.7 to 15.4GHz 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}	26	dBm
Storage Temperature	T_{stg}	-55 to +125	deg.C

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Condition	Unit
Drain-Source Voltage	V_{DD}	<= 7	V
Input Power	P_{in}	<= 16	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.	
RF Frequency Range	f	V_{DD}=+6V	12.7	-	15.4	GHz
Output Power at 1dB G.C.P.	P_{1dB}	$I_{DD(DC)}$=1200mA typ.	32	33	-	dBm
Power Gain at 1dB G.C.P.	G_{1dB}	Z_S=Z_L=50ohm	20	25	-	dB
Power-added Efficiency at 1dB G.C.P.	N_{add}		-	25	-	%
Drain Current at 1dB G.C.P.	I_{DDRF}		-	1500	1800	mA
3rd. Order Intermodulation Distortion *	IM_3	* df=+10MHz	-38	-44	-	dBc
Input Return Loss (at Pin=-20dBm)	RL_{IN}	Po=20dBm S.C.L.	-	-8	-	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

CASE STYLE	VU

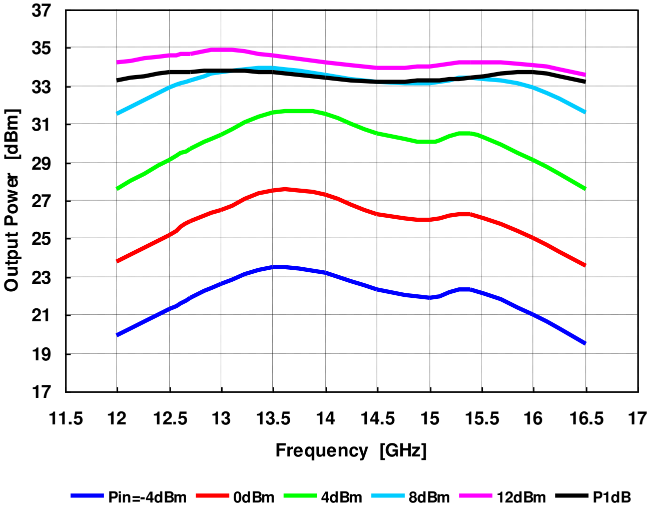
RoHs Compliance	Yes

ORDERING INFORMATION

Part Number	Order Unit	Packing
EMM5075VU	No Limitation	48 pcs./Tray × 4 Tray = 192 pcs./Packing
EMM5075VUT	500pcs.	500 pcs./Reel × 1 Reel = 500 pcs./Packing

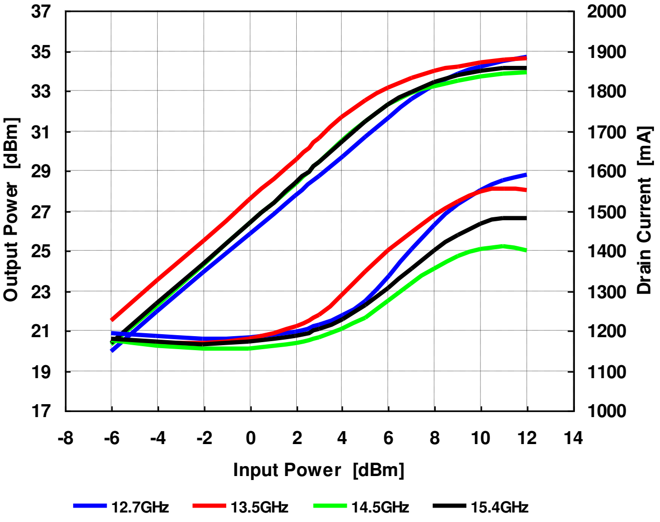
OUTPUT POWER vs. FREQUENCY

@VDD=6V, IDD(DC)=1200mA



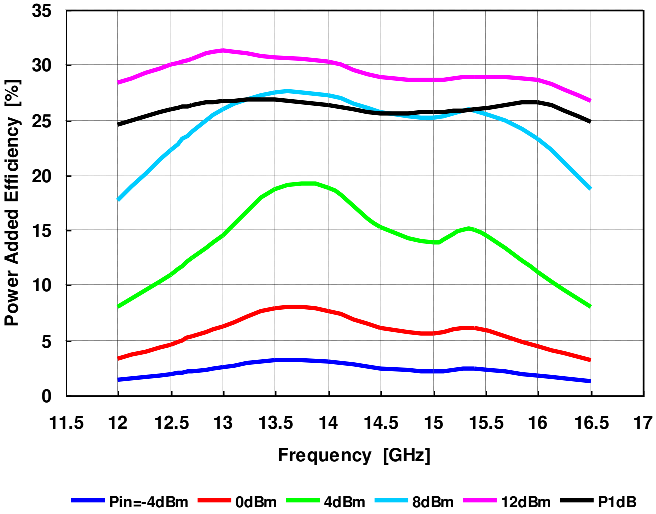
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER

@VDD=6V, IDD(DC)=1200mA



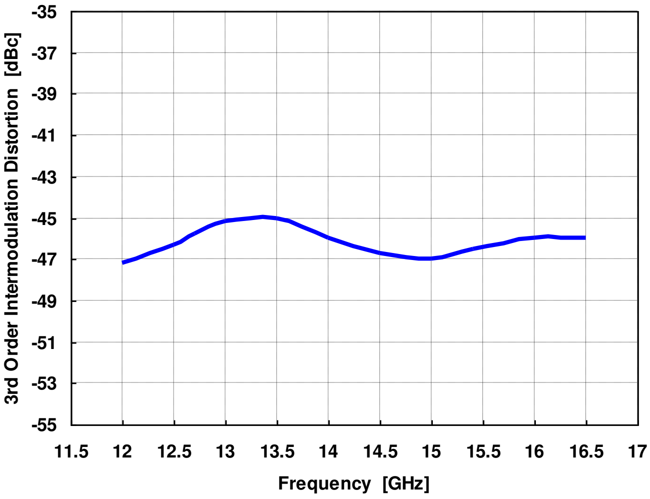
POWER-ADDED EFFICIENCY vs. FREQUENCY

@VDD=6V, IDD(DC)=1200mA



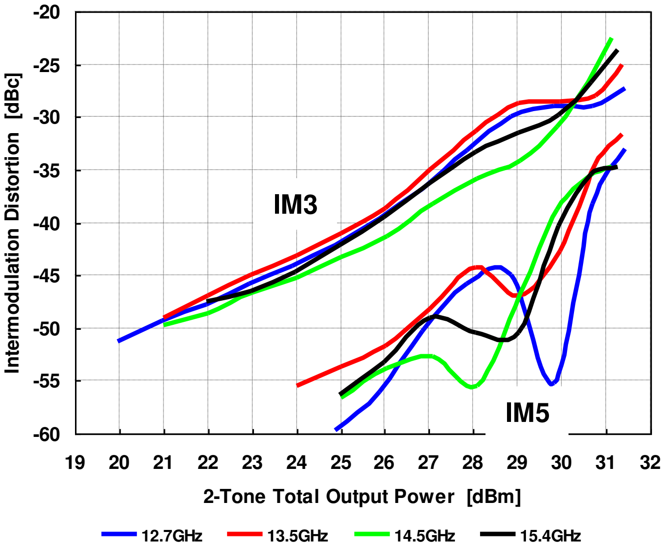
IMD vs. FREQUENCY

@VDD=6V, IDD(DC)=1200mA, Pout=20dBm S.C.L.



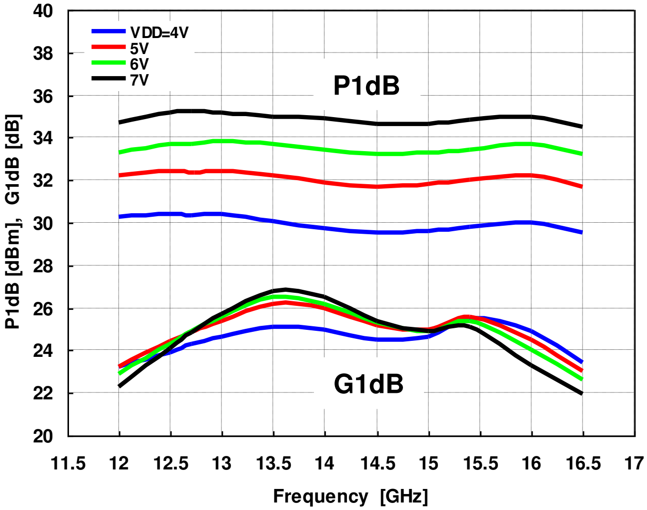
IMD vs. OUTPUT POWER

@VDD=6V, IDD(DC)=1200mA



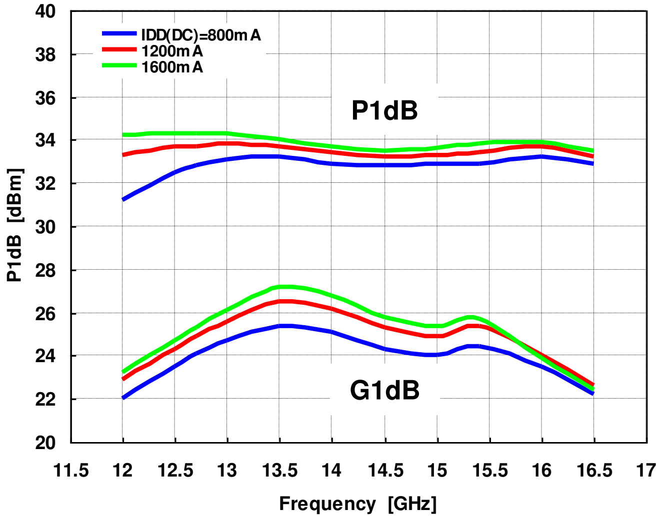
P1dB, G1dB vs. Frequency by Drain Voltage

IDD(DC)=1200mA



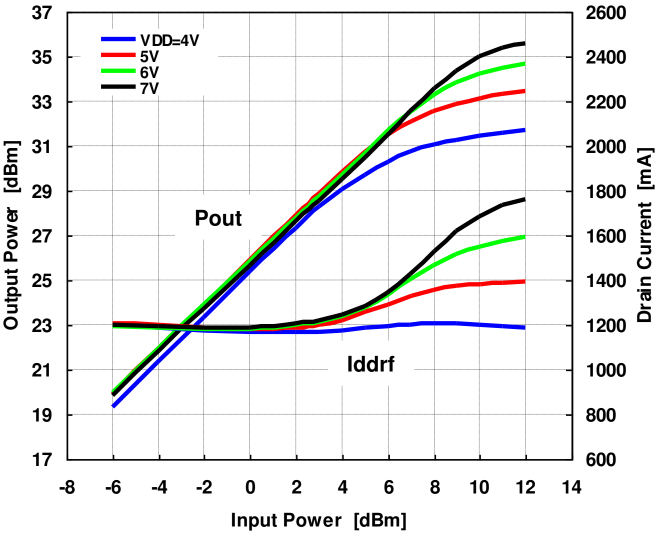
P1dB, G1dB vs. Frequency by Drain Current

@VDD=6V



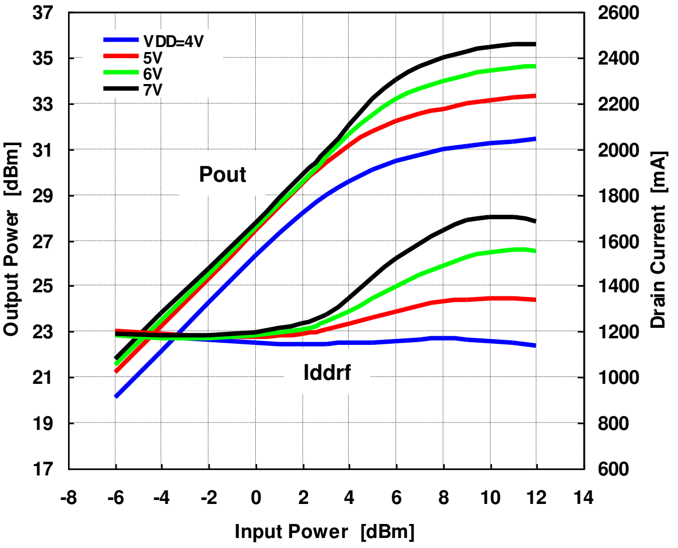
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

@IDD(DC)=1200mA, f=12.7GHz



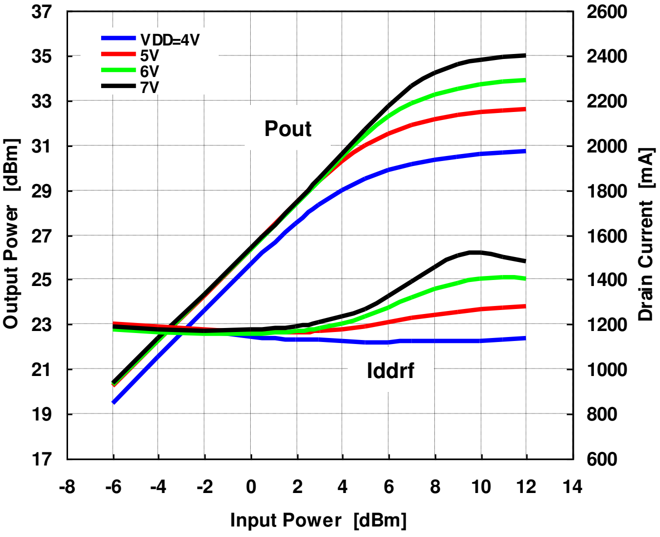
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

@IDD(DC)=1200mA, f=13.5GHz



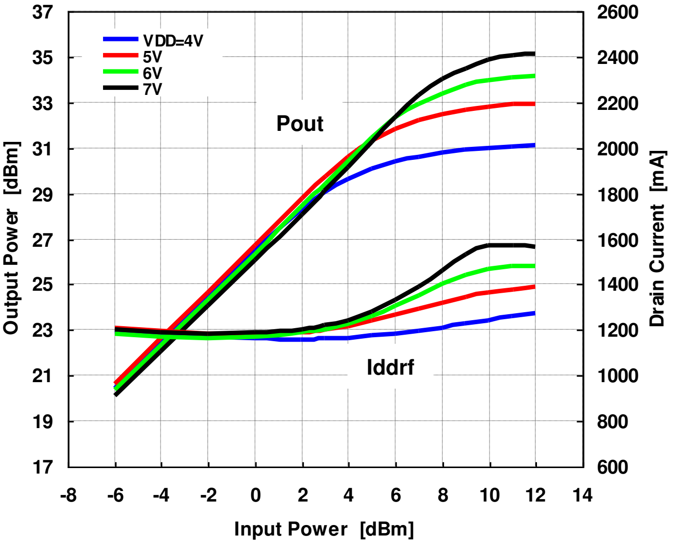
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

@IDD(DC)=1200mA, f=14.5GHz



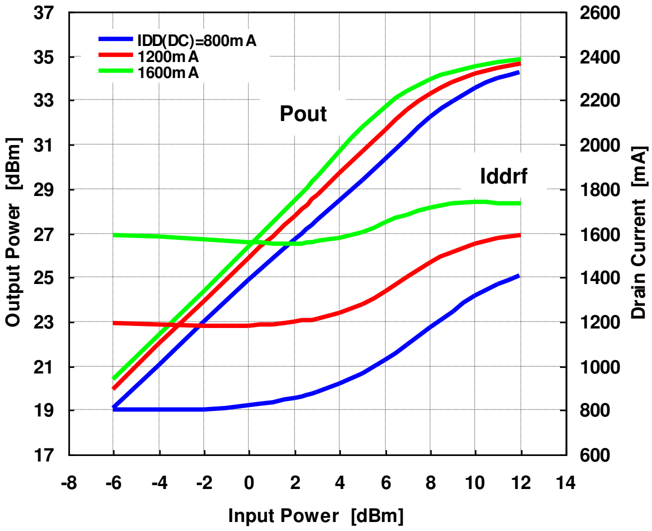
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

@IDD(DC)=1200mA, f=15.4GHz



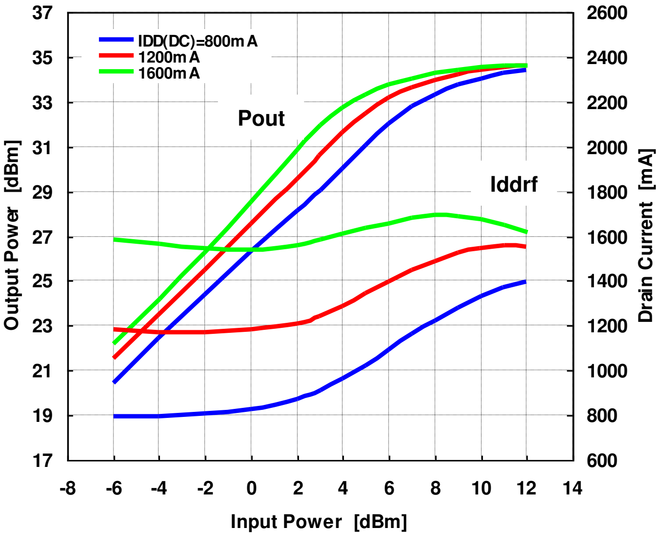
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

@VDD=6V, f=12.7GHz



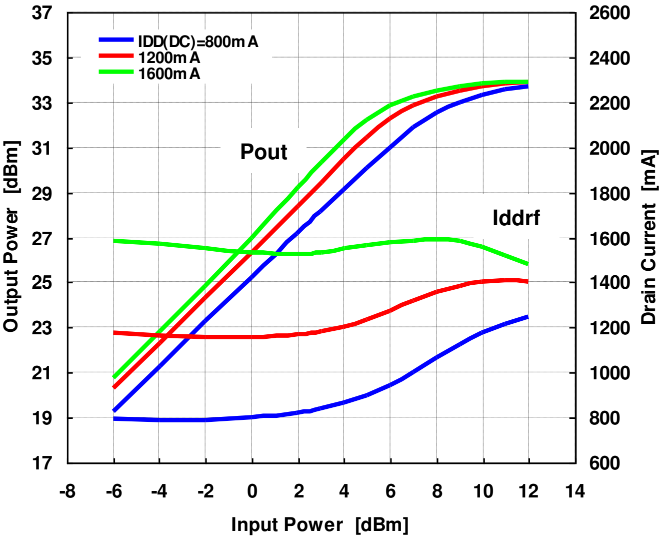
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

@VDD=6V, f=13.5GHz



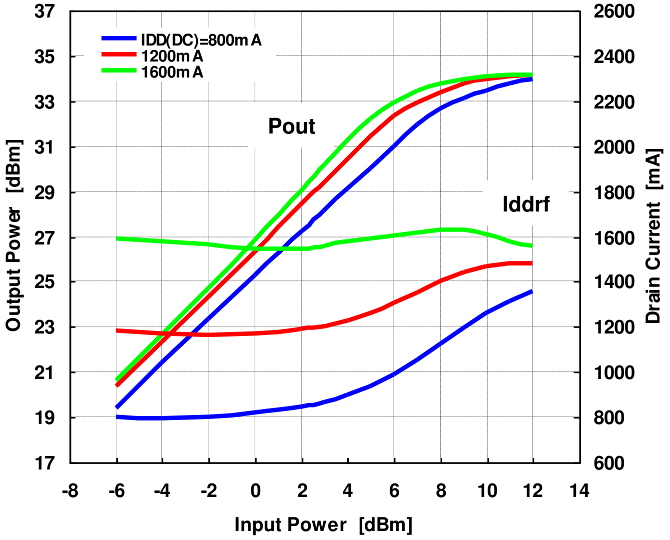
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

@VDD=6V, f=14.5GHz



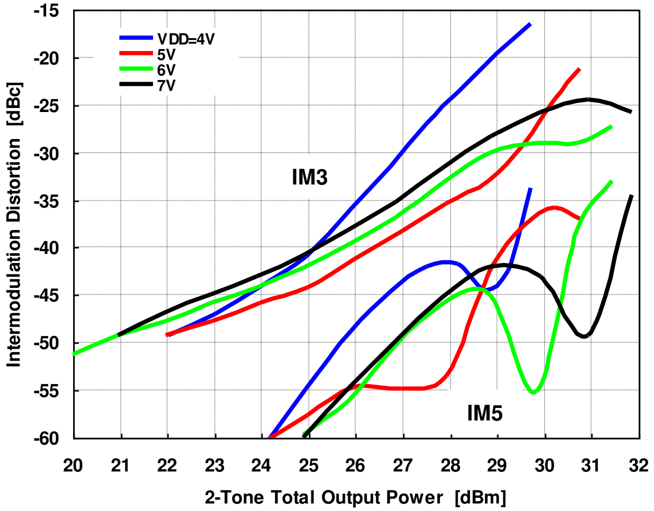
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

@VDD=6V, f=15.4GHz



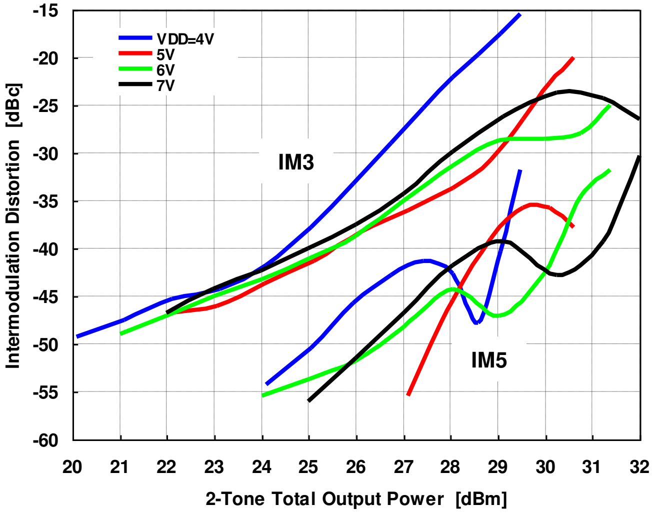
IMD PERFORMANCE vs. OUTPUT POWER by Drain Voltage

@IDD(DC)=1200mA, f=12.7GHz



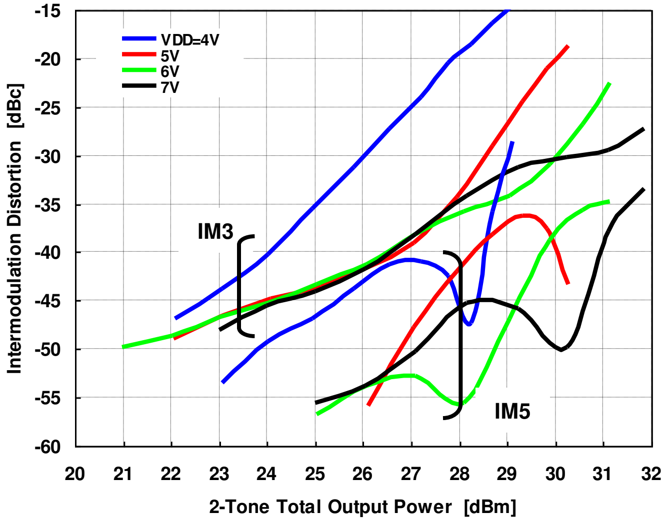
IMD PERFORMANCE vs. OUTPUT POWER by Drain Voltage

@IDD(DC)=1200mA, f=13.5GHz



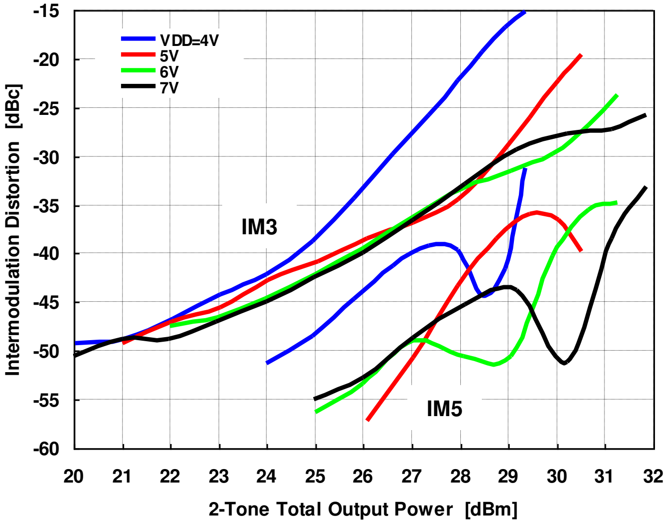
IMD PERFORMANCE vs. OUTPUT POWER by Drain Voltage

@IDD(DC)=1200mA, f=14.5GHz



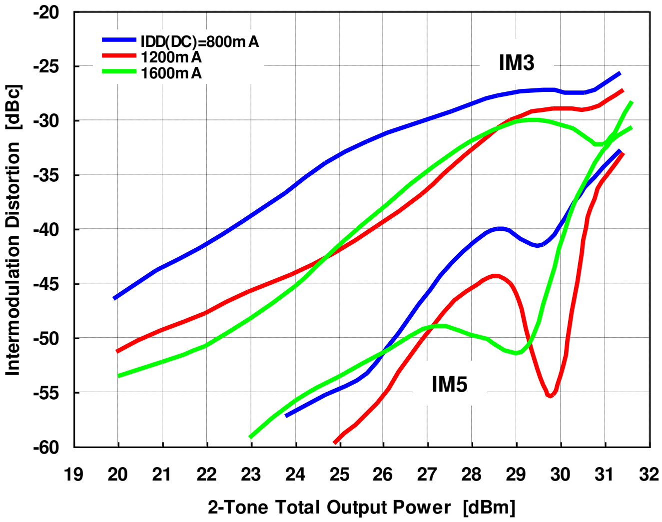
IMD PERFORMANCE vs. OUTPUT POWER by Drain Voltage

@IDD(DC)=1200mA, f=15.4GHz



IMD PERFORMANCE vs. OUTPUT POWER by Drain Current

@VDD=6V, f=12.7GHz



IMD PERFORMANCE vs. OUTPUT POWER by Drain Current

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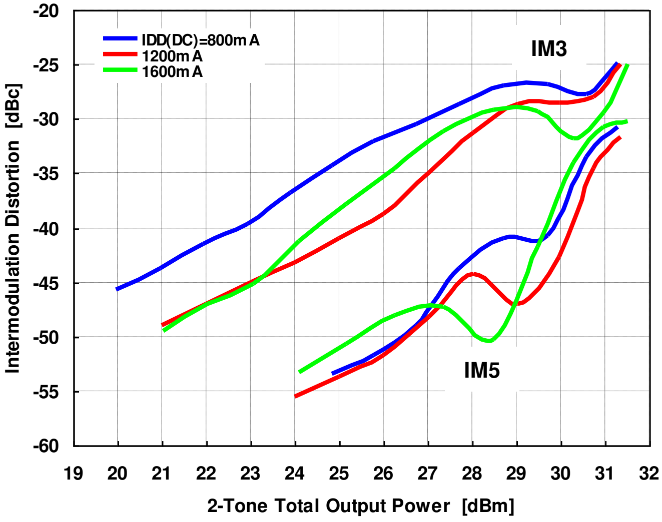

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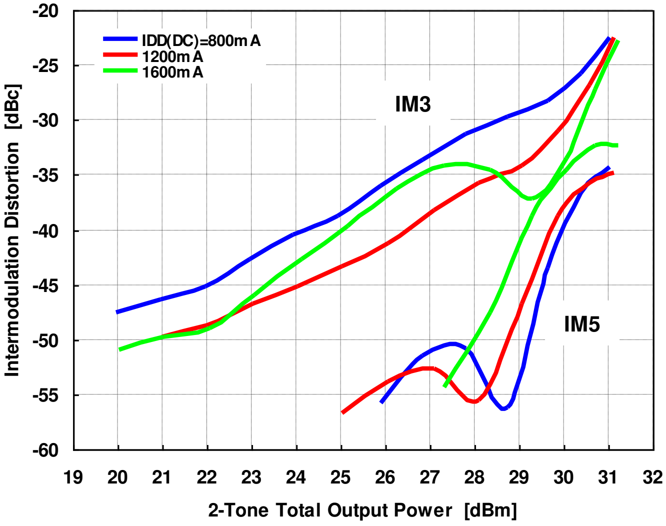

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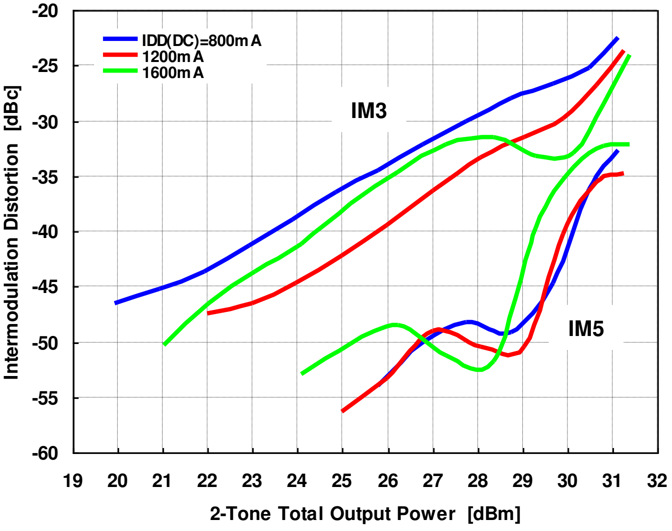
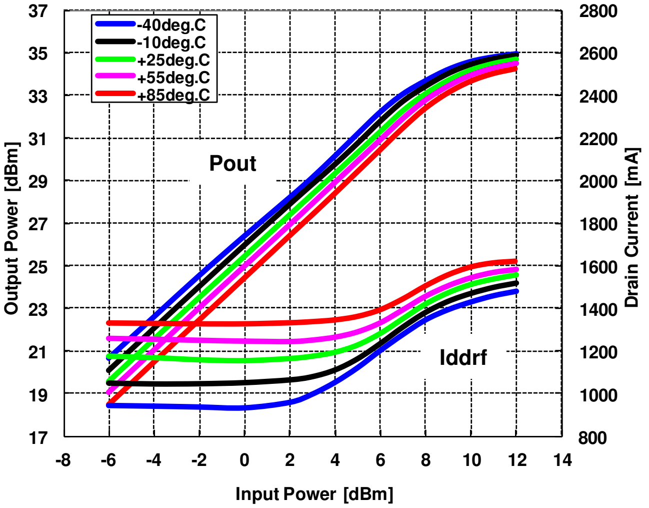
@VDD=6V, f=15.4GHz



OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Temperature

@VDD=6V, IDD(DC)=1200mA(@Tc=+25deg.C), Freq.=12.7GHz



OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Temperature

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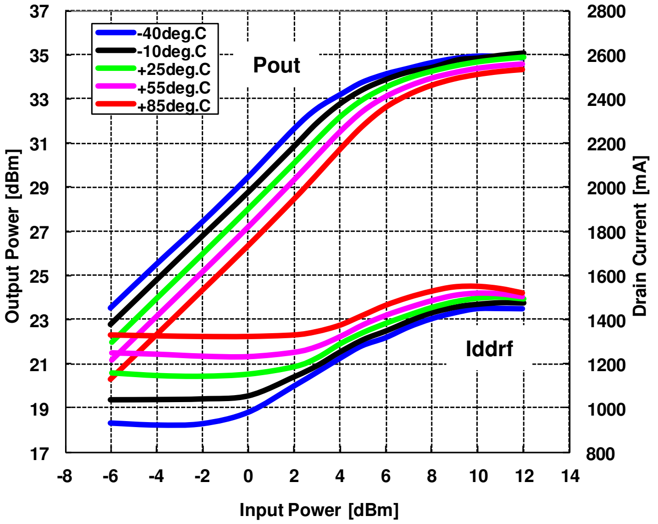

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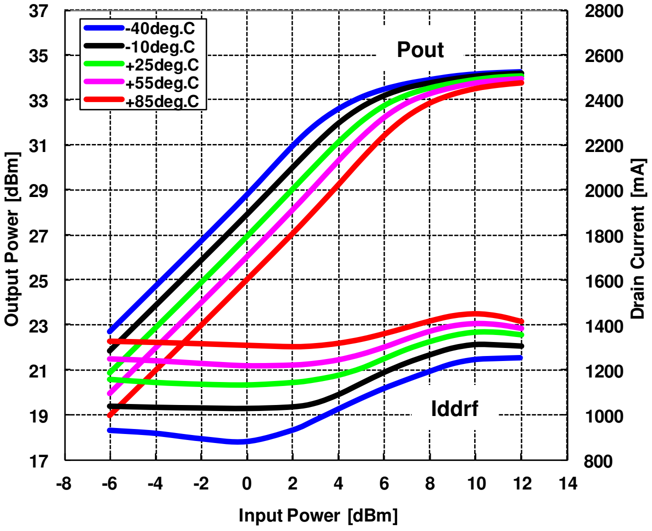

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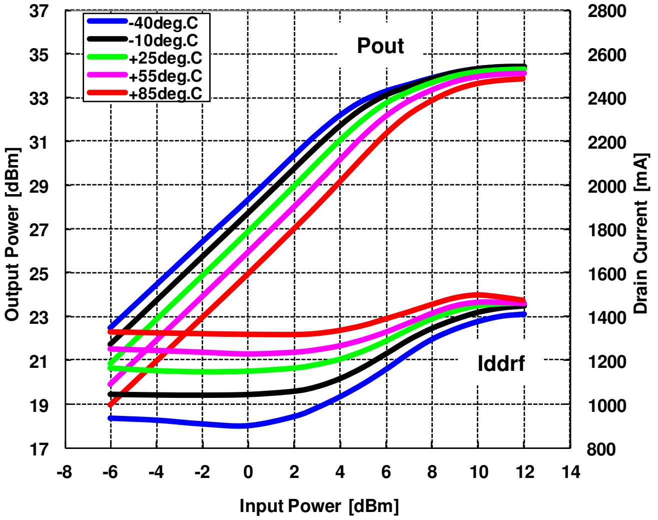

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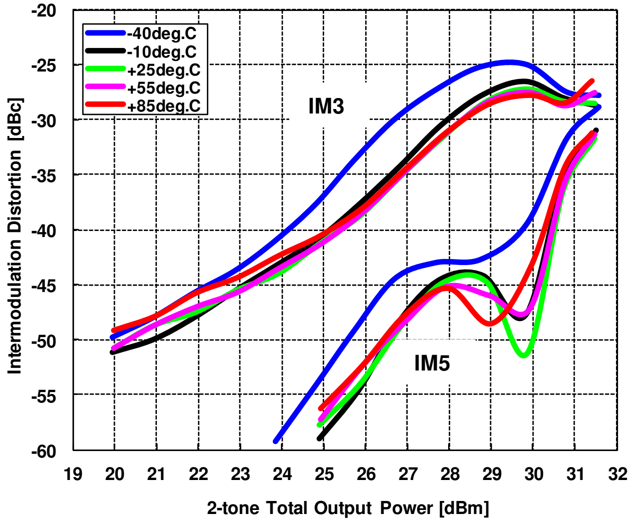

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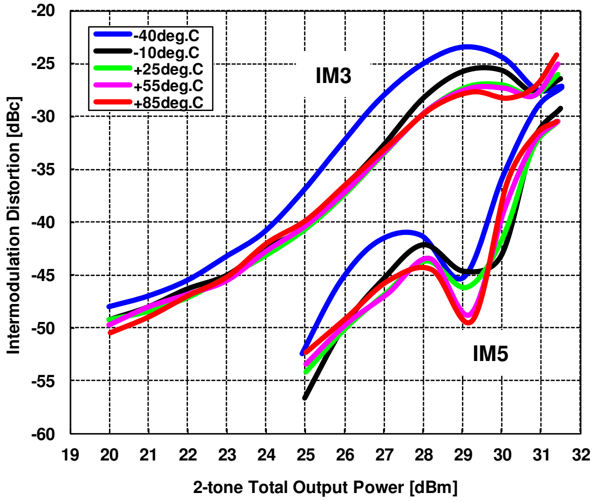
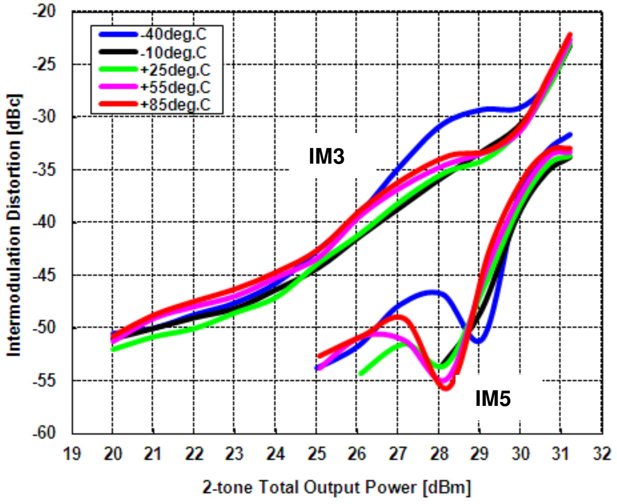


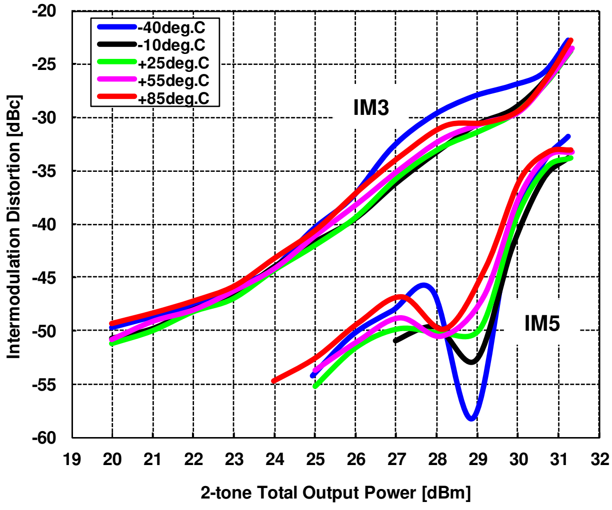
IMD PERFORMANCE vs. OUTPUT POWER by Temperature

@VDD=6V, IDD(DC)=1200mA(@Tc=+25deg.C), Freq.=14.5GHz



IMD PERFORMANCE vs. OUTPUT POWER by Temperature

@VDD=6V, IDD(DC)=1200mA(@Tc=+25deg.C), Freq.=15.4GHz



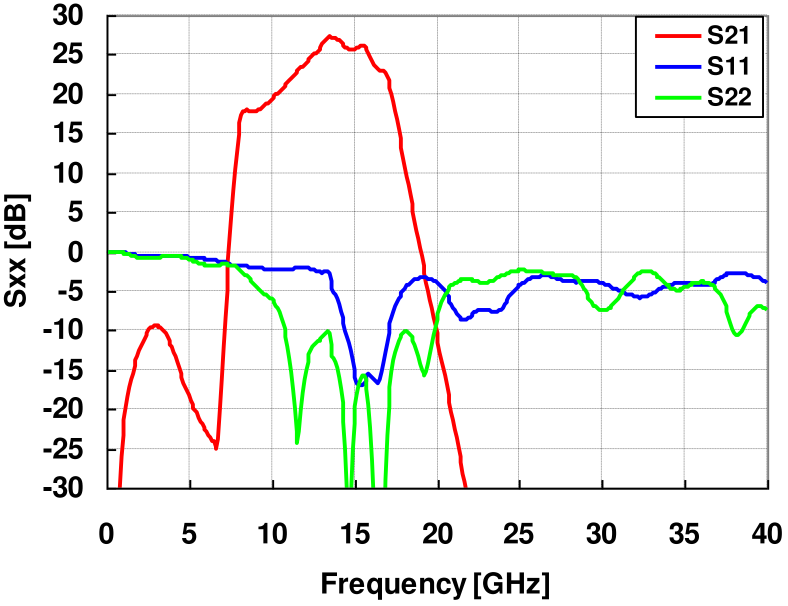
■S-PARAMETER

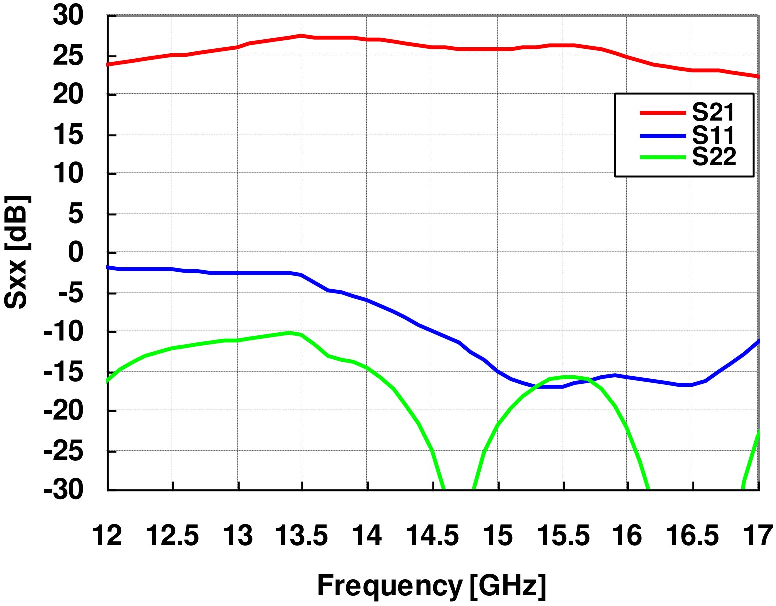
VDD=6V, IDD(DC)=1200mA

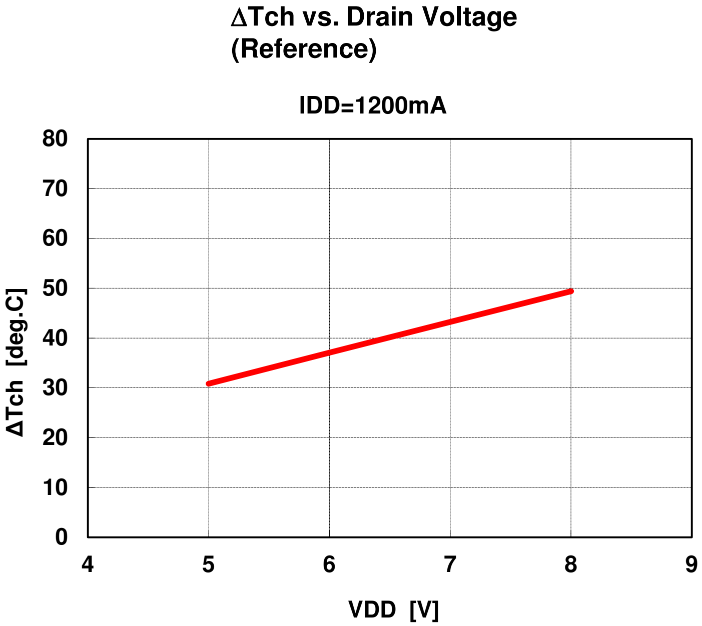
Frequency	S11		S21		S12		S22	
[GHz]	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.98	-31.4	0.07	10.1	0.00	148.6	0.97	-43.8
2.0	0.94	-63.4	0.23	-151.6	0.00	-147.9	0.91	-85.9
3.0	0.92	-91.4	0.34	92.9	0.00	-162.8	0.91	-123.0
4.0	0.94	-115.1	0.24	-1.9	0.00	160.8	0.93	-157.1
5.0	0.92	-138.3	0.12	-55.7	0.00	114.8	0.89	163.4
6.0	0.89	-165.3	0.07	-61.7	0.00	65.9	0.82	111.5
7.0	0.86	159.5	0.15	37.2	0.00	6.2	0.82	60.6
8.0	0.80	125.0	5.49	-72.1	0.00	-84.6	0.78	14.7
9.0	0.79	92.0	7.76	122.2	0.00	-127.2	0.61	-46.8
10.0	0.77	53.2	9.14	19.2	0.00	-138.8	0.50	-115.3
11.0	0.76	7.8	11.88	-78.8	0.00	-162.2	0.25	-155.6
12.0	0.79	-28.4	15.33	-179.5	0.00	-116.3	0.15	-47.7
12.2	0.79	-34.5	16.08	160.0	0.00	-105.6	0.20	-47.1
12.4	0.77	-39.5	16.90	139.3	0.00	-97.6	0.23	-48.4
12.6	0.76	-44.0	17.77	118.3	0.00	-103.2	0.26	-49.7
12.8	0.74	-48.3	18.64	97.1	0.00	-105.2	0.27	-50.1
13.0	0.73	-51.9	19.81	75.9	0.00	-114.8	0.28	-49.7
13.2	0.73	-56.9	21.23	53.4	0.00	-127.9	0.29	-50.9
13.4	0.74	-64.6	22.75	28.4	0.00	-146.6	0.31	-57.3
13.6	0.64	-77.2	22.65	1.0	0.00	170.4	0.26	-72.2
13.8	0.55	-78.3	22.27	-21.7	0.00	-170.9	0.21	-66.7
14.0	0.50	-85.0	22.05	-46.9	0.00	-156.1	0.18	-72.5
14.2	0.42	-91.1	21.10	-70.5	0.00	-163.2	0.13	-80.5
14.4	0.35	-95.3	20.19	-93.0	0.00	-161.3	0.08	-88.4
14.6	0.29	-98.2	19.50	-114.5	0.00	-162.0	0.03	-102.1
14.8	0.24	-103.5	19.06	-136.2	0.00	-158.6	0.03	104.6
15.0	0.18	-104.1	19.00	-157.4	0.00	-159.6	0.08	81.7
15.2	0.15	-99.8	19.42	-180.0	0.00	-157.1	0.12	67.1
15.4	0.14	-97.7	19.92	154.7	0.00	-156.7	0.16	51.7
15.6	0.15	-101.4	20.04	127.5	0.00	-159.4	0.16	31.3
15.8	0.16	-116.3	18.96	98.8	0.00	-168.2	0.13	5.9
16.0	0.16	-139.8	16.92	71.9	0.00	-176.1	0.08	-24.6
16.2	0.15	-170.2	15.17	48.4	0.00	179.7	0.02	-70.7
16.4	0.15	154.4	14.31	26.0	0.01	171.8	0.02	163.1
16.6	0.15	111.0	14.09	1.2	0.01	168.7	0.02	122.4
16.8	0.20	68.9	13.80	-27.7	0.01	160.2	0.01	-40.0
17.0	0.27	33.1	12.88	-59.9	0.01	151.0	0.07	-85.9
18.0	0.57	-56.0	3.97	157.9	0.00	131.8	0.30	-161.4
19.0	0.67	-87.2	1.05	54.6	0.01	92.1	0.19	132.6
20.0	0.63	-108.3	0.30	-35.1	0.00	43.6	0.37	2.2
21.0	0.44	-150.9	0.09	-121.3	0.00	172.3	0.61	-32.0
22.0	0.38	119.9	0.02	145.1	0.01	47.1	0.66	-55.1
23.0	0.42	50.3	0.01	-13.0	0.01	-41.5	0.63	-104.1
24.0	0.44	-36.6	0.01	-119.4	0.01	-122.6	0.71	-159.7
25.0	0.60	-100.2	0.01	148.1	0.01	149.3	0.76	177.9
26.0	0.69	-125.3	0.01	3.2	0.01	-0.1	0.75	169.1
27.0	0.69	-150.0	0.00	14.8	0.00	-100.2	0.71	157.3
28.0	0.65	173.7	0.01	-19.9	0.01	-19.4	0.70	138.5
29.0	0.64	127.2	0.01	-131.8	0.01	-136.7	0.55	109.1
30.0	0.63	72.0	0.01	176.4	0.00	-175.6	0.42	98.2
31.0	0.57	19.4	0.01	119.7	0.01	123.3	0.51	85.5
32.0	0.52	-45.9	0.00	2.3	0.00	5.9	0.68	67.2
33.0	0.53	-114.4	0.00	-119.1	0.00	-111.2	0.73	44.4
34.0	0.60	-146.9	0.01	161.4	0.01	166.6	0.60	8.2
35.0	0.64	-167.2	0.01	58.5	0.02	60.4	0.59	-50.3
36.0	0.61	158.7	0.02	-8.5	0.02	-9.4	0.64	-82.6
37.0	0.66	111.5	0.02	-87.3	0.02	-87.7	0.56	-101.4
38.0	0.73	70.6	0.00	85.6	0.01	130.1	0.30	166.7
39.0	0.70	48.1	0.02	-75.8	0.02	-74.8	0.40	70.6
40.0	0.63	28.1	0.02	175.2	0.02	174.3	0.42	42.8

■S-PARAMETER

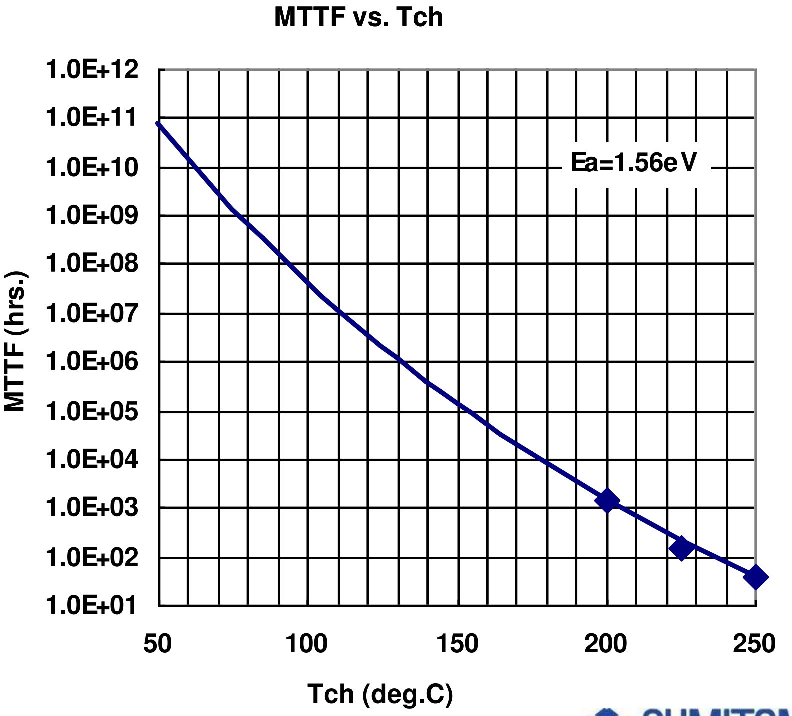
VDD=6V, IDD(DC)=1200mA



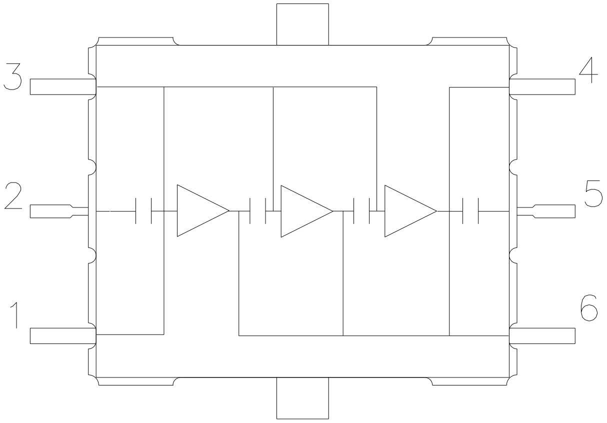




Note: ΔTch : Temperature Rise from Backside of the Package to Channel.

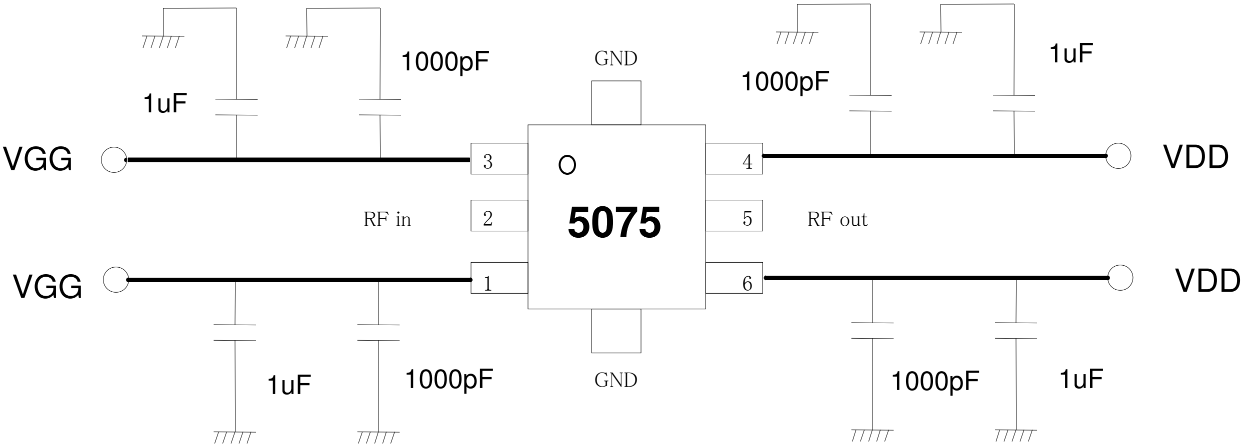


■ Block diagram



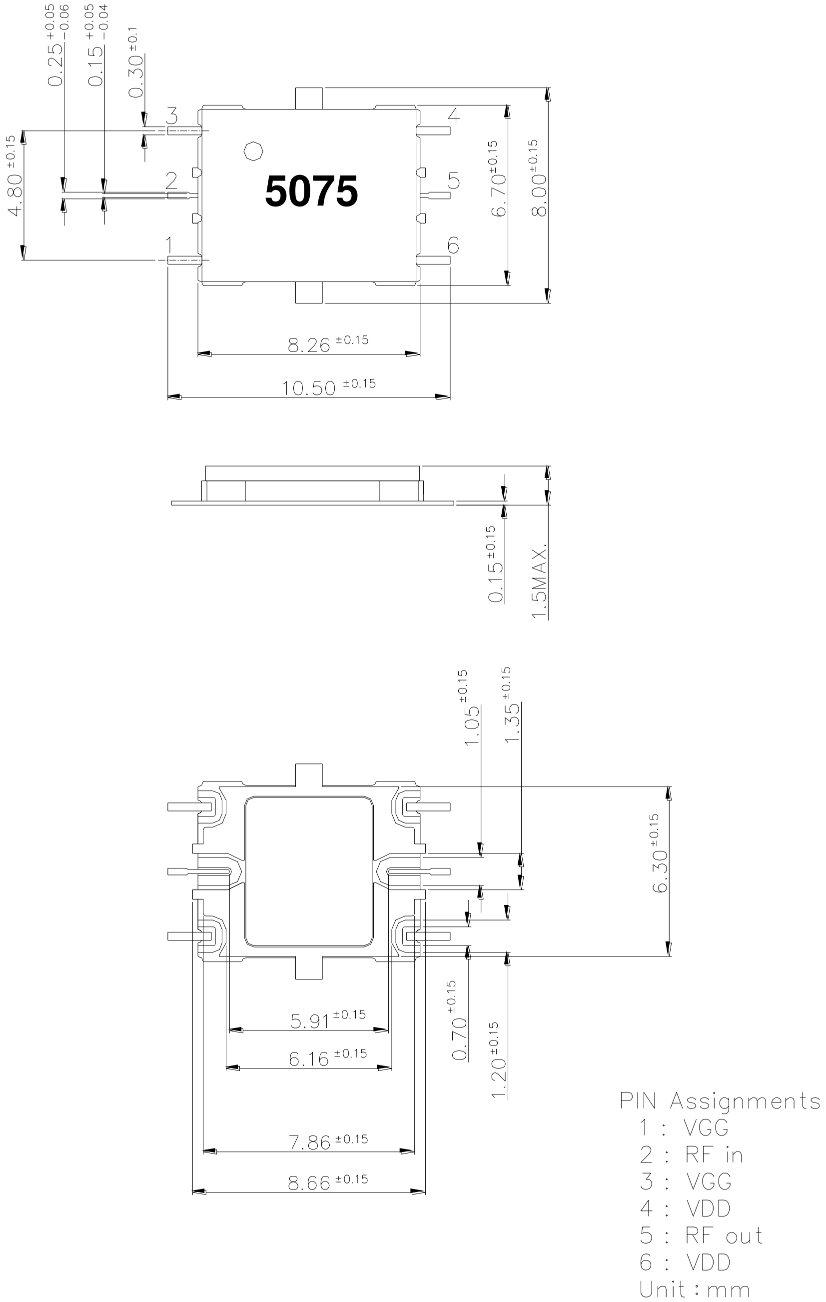
PIN ASSIGNMENT
1 : VGG
2 : RF in
3 : VGG
4 : VDD
5 : RF out
6 : VDD

■ Recommended Bias Circuit



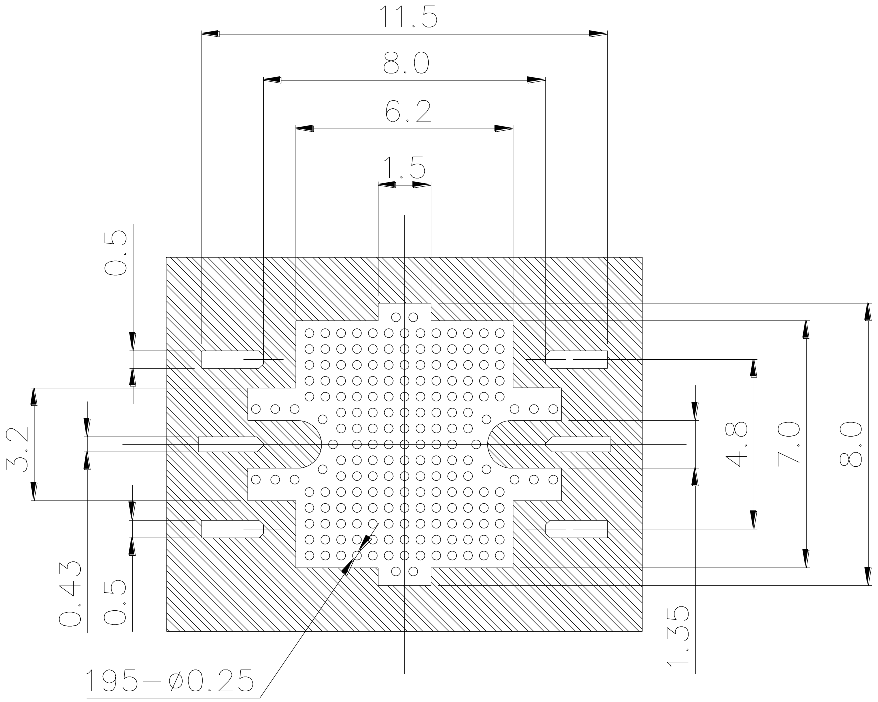
Note 1: The capacitors are recommended on the bias supply line, close to the package,
in order to prevent video oscillations which could damage the module.
Note 2: Two pins named VGG are internally connected.
Note 3: Two pins named VDD are internally connected.

■ Package Outline



PIN Assignments
1 : VGG
2 : RF in
3 : VGG
4 : VDD
5 : RF out
6 : VDD
Unit : mm

■ PCB Pads and Solder-resist Pattern

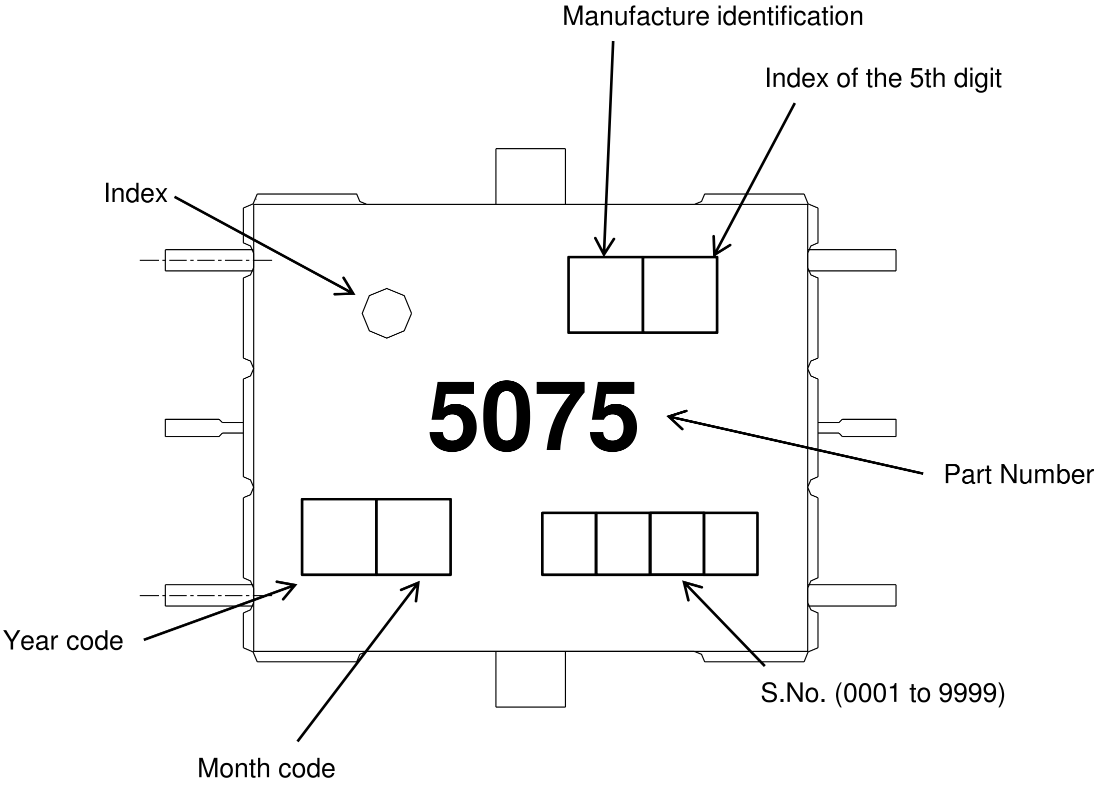


Notes :

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)

2. ▨ : Resist

■ Marking Information



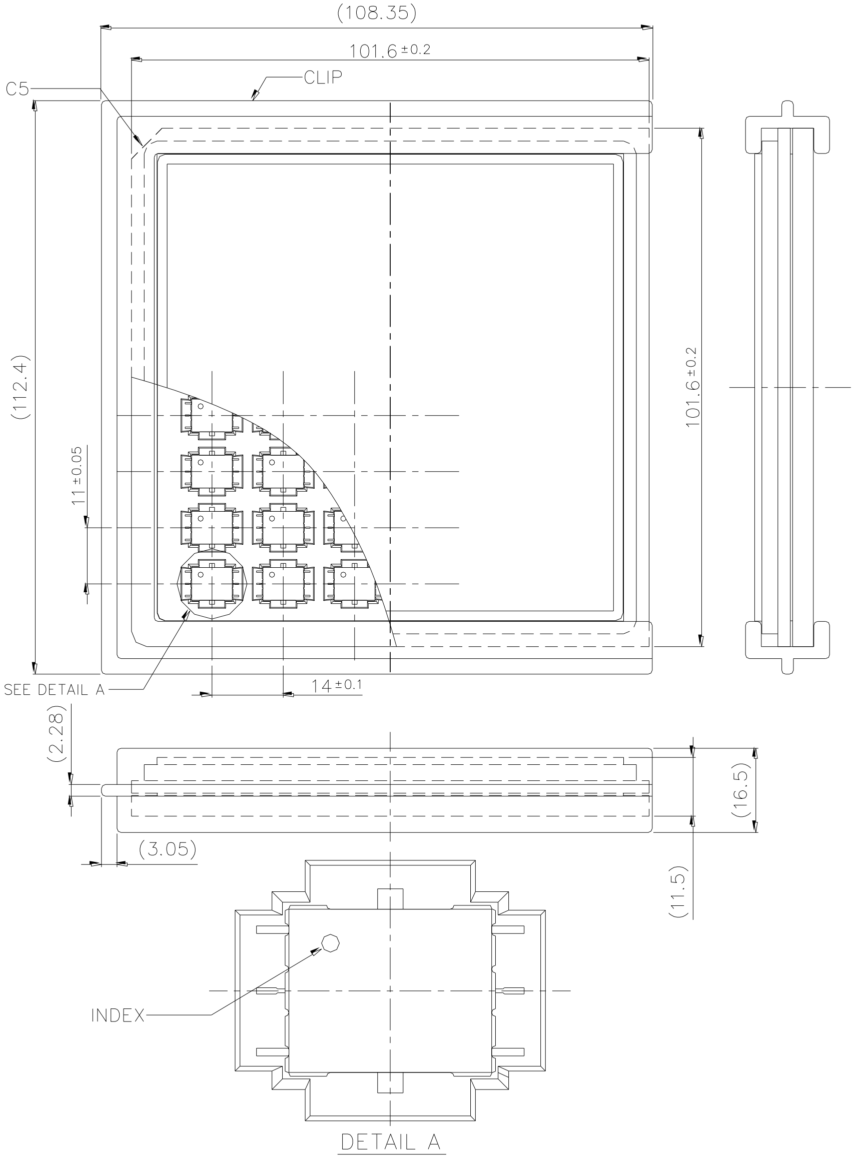
<Year code>

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

<Month code>

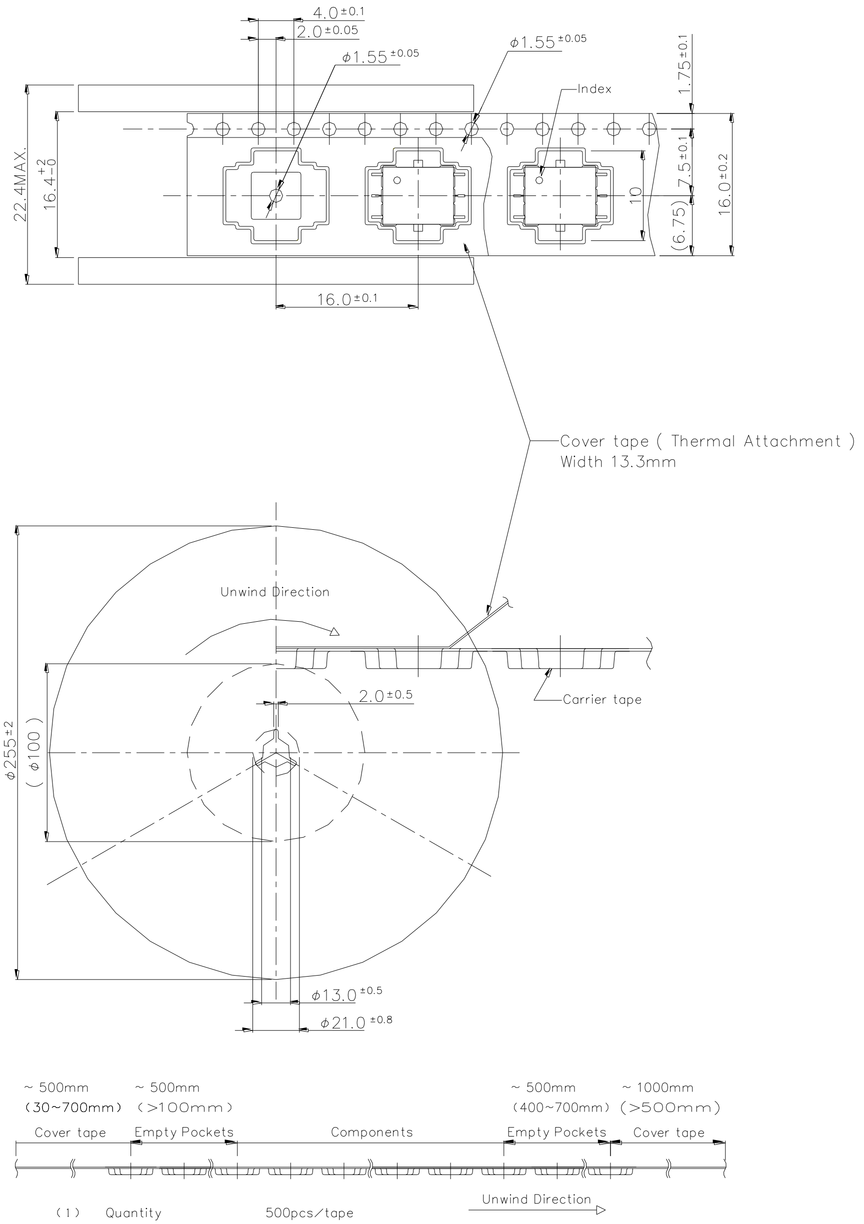
Code	H	M	N	P	R	S	T	U	W	X	Y	Z
Month	1	2	3	4	5	6	7	8	9	10	11	12

■ 4-inch Tray Packing (Part No. : EMM5075VU)



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

■ Tape and Reel Packing (Part No. : EMM5075VUT)



(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.)

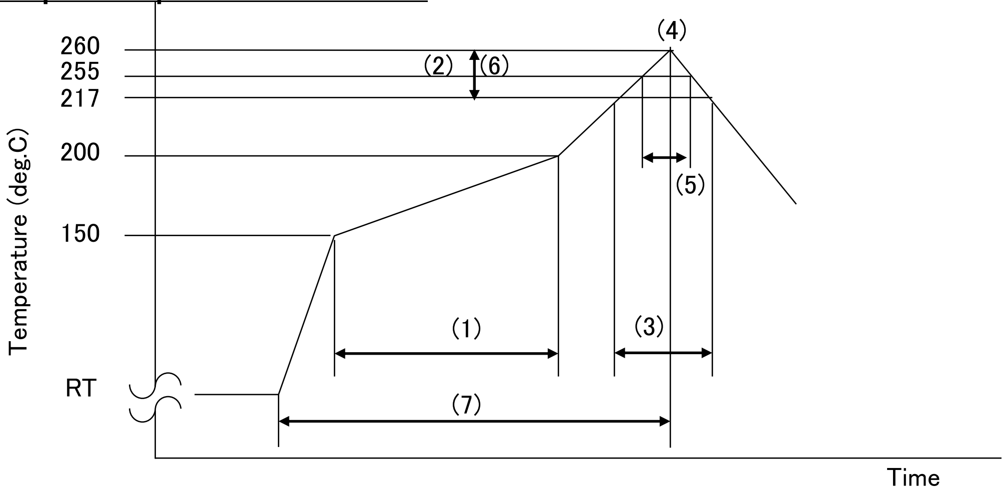
(2) A rosin type flux with a chlorine content of 0.2% or less shall be used. The rosin flux with low halogen content is recommended.

(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:	255deg.C, 30seconds max
(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 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.