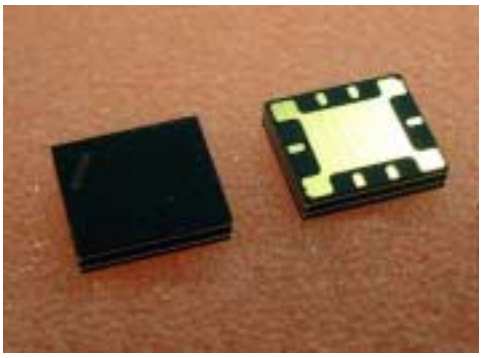
Preliminary

ES/FMM5804YD

K,Ka-Band Power Amplifier MMIC

FEATURES

- High Output Power; P_{1dB} = 24.5 dBm (Typ.)
- High Linear Gain; G_L = 17 dB(Typ.)
- Frequency Band ; 17.5 - 30.0 GHz
- SMT Laminate Package (YD Package)
- Impedance Matched Zin/Zout = 50Ω



DESCRIPTION

The FMM5804YD is a power amplifier MMIC that contains a four stage amplifier, internally matched, for standard communications band in 17.5 to 30.0GHz frequency range. This product is well suited for P-to-P, Ka-band V-SAT applications.

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

ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Unit
Drain-Source Voltage	V_{DD}	10	V
Gate-Source Voltage	V_{GG}	-3	V
Input Power	P_{in}	16	dBm
Storage Temperature	T_{stg}	-55 to +125	°C

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Recommend	Unit
Dorain-Source Voltage	V_{DD}	<= 6	V
Input Power	P_{in}	<= +13	dBm
Operating Case Temperature	T_C	-40 to +85	°C

ELECTRICAL CHARACTERISTICS (Ambient Temperature Ta=25°C)

Item	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Output Power at 1dB G.C.P.	P_{1dB}	V_{DD}=6V typ. $I_{DD(DC)}$=250mA typ. Z_S=Z_L=50ohm	22.5	24.5	-	dBm
Power Gain at 1dB G.C.P.	G_{1dB}		13	16	-	dB
Power-added Efficiency at 1dB G.C.P.	η_{add}		-	10	-	%
Drain Current at 1dB G.C.P.	I_{DDRF}		-	350	430	mA
Input Return Loss (at Pin=-20dBm)	RL_{in}		-	-15	-	dB
Output Return Loss (at Pin=-20dBm)	RL_{out}		-	-8	-	dB

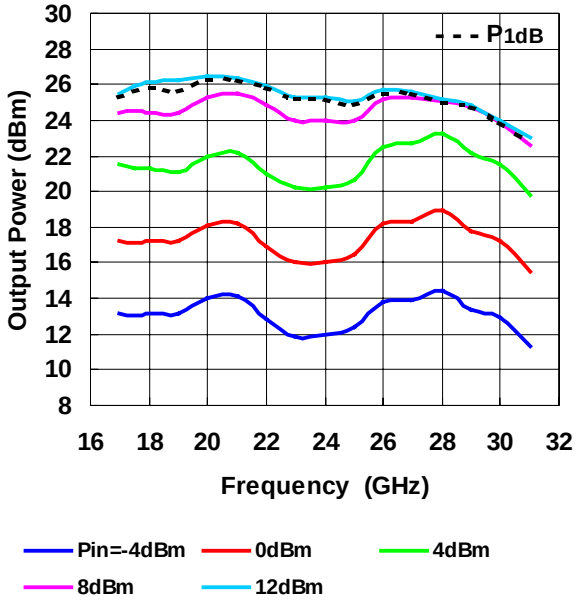
G.C.P. : Gain Compression Point

ESD	Class 0	~ 199V

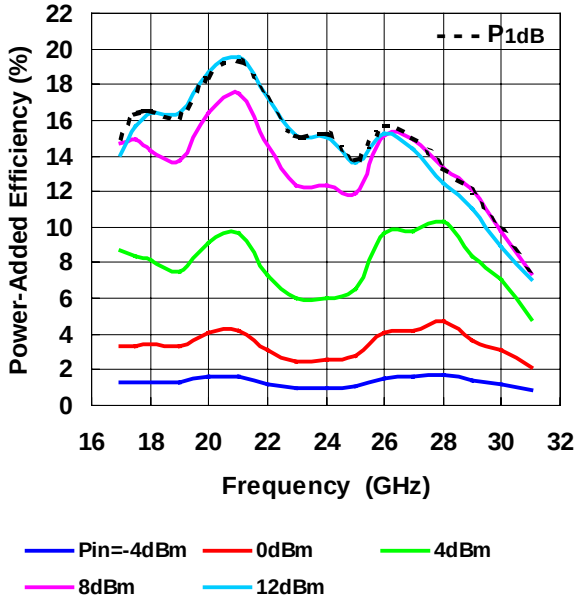
Note : Based on EIAJ ED-4701 C-111A(C=100pF, R=1.5kW)

Case Style	YD

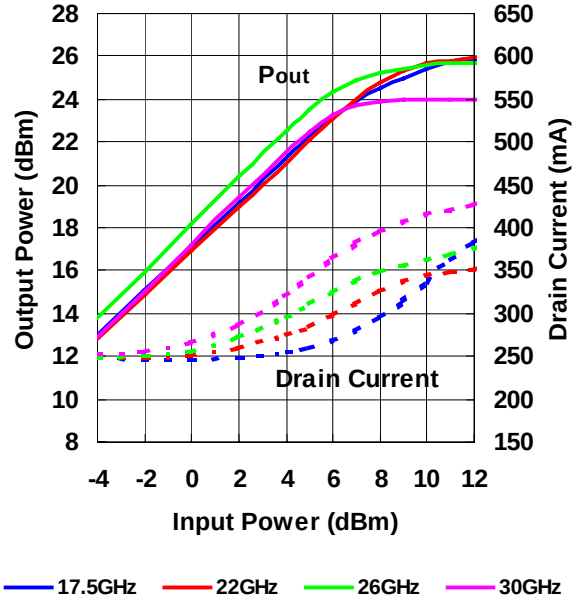
Output Power vs. Frequency
@ V_{DD}=6V, $I_{DD(DC)}$=250mA



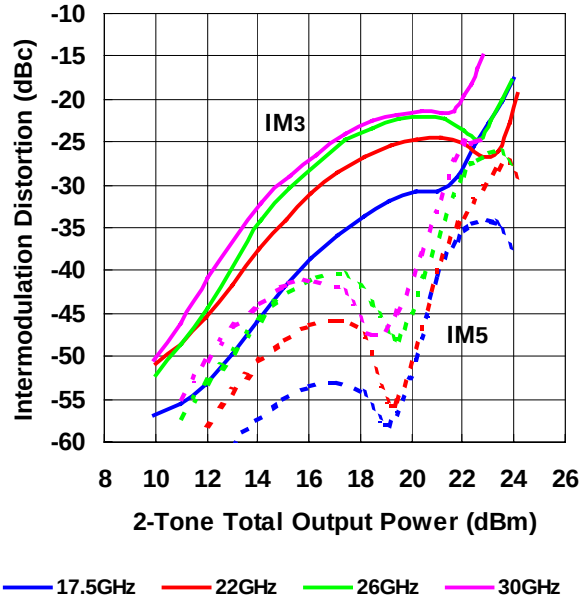
Power Added Efficiency vs. Frequency
@ V_{DD}=6V, $I_{DD(DC)}$=250mA



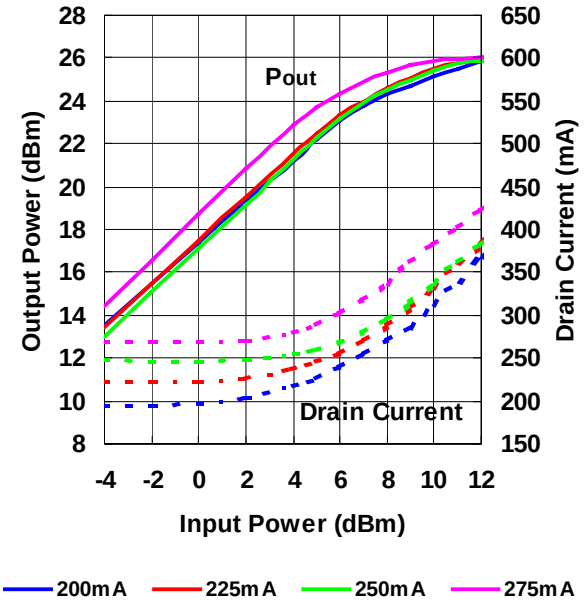
Output Power, Drain Current vs. Input Power
@ V_{DD}=6V, $I_{DD(DC)}$=250mA



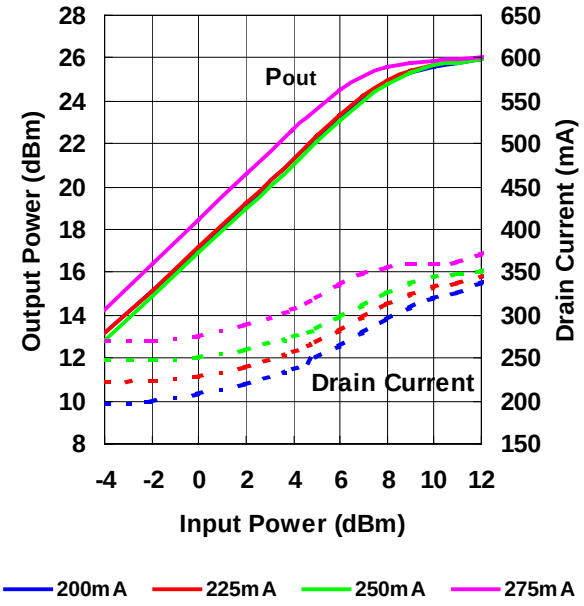
IMD Performance vs. Total Output Power
@ V_{DD}=6V, $I_{DD(DC)}$=250mA
Δf=+10MHz, 2-Tone test



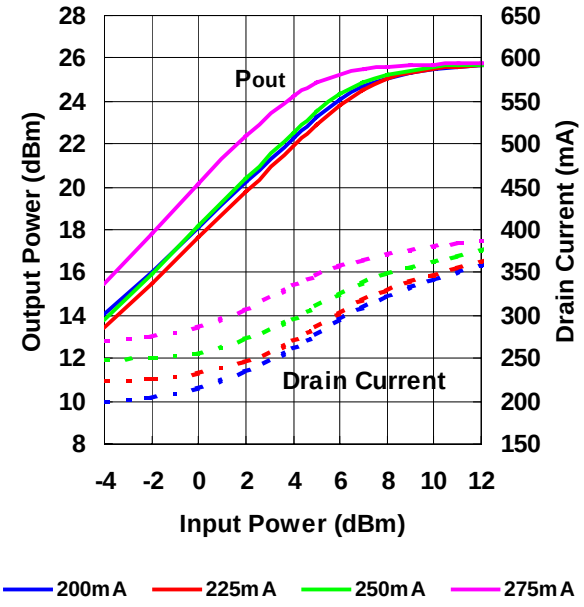
Output Power, Drain Current vs. Input Power by Drain Current @ freq.=17.5GHz, VDD=6V



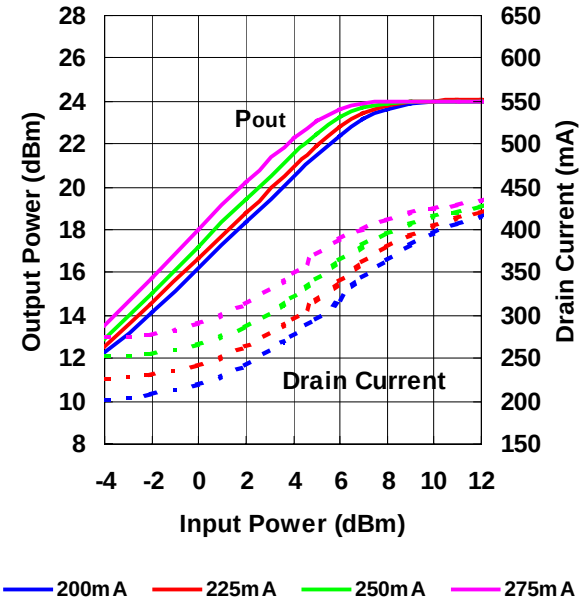
Output Power, Drain Current vs. Input Power by Drain Current @ freq.=22GHz, VDD=6V



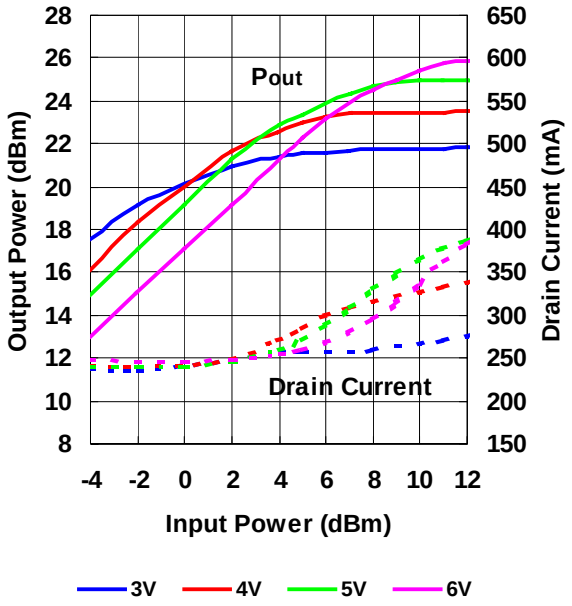
Output Power, Drain Current vs. Input Power by Drain Current @ freq.=26GHz, VDD=6V



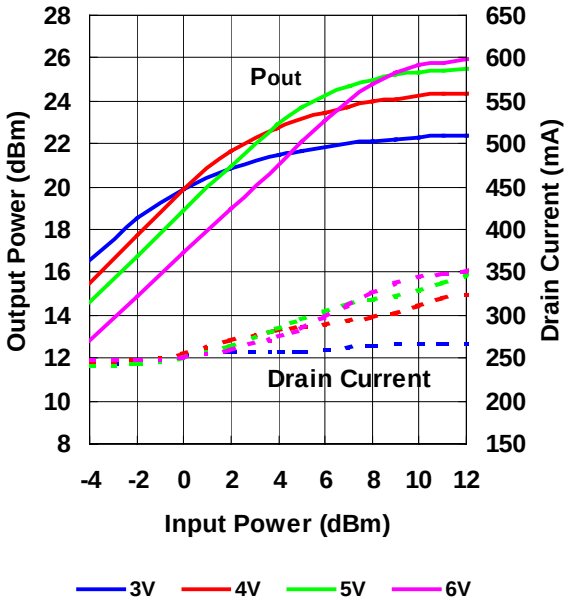
Output Power, Drain Current vs. Input Power by Drain Current @ freq.=30GHz, VDD=6V



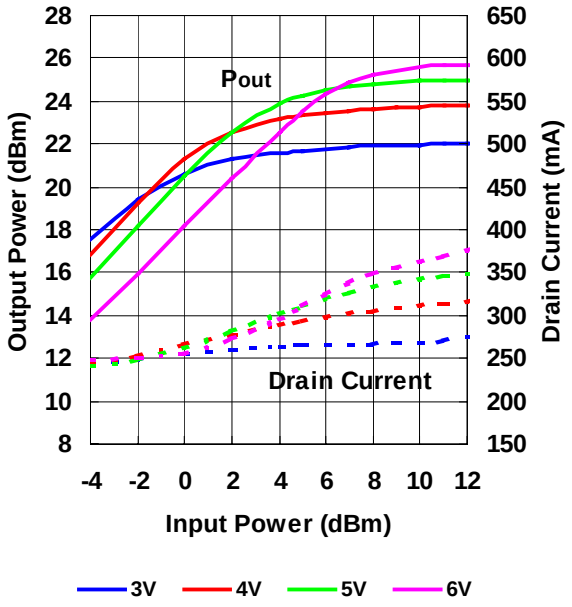
Output Power, Drain Current vs. Input Power by Drain Voltage @ freq.=17.5GHz, $I_{DD(DC)}$=250mA



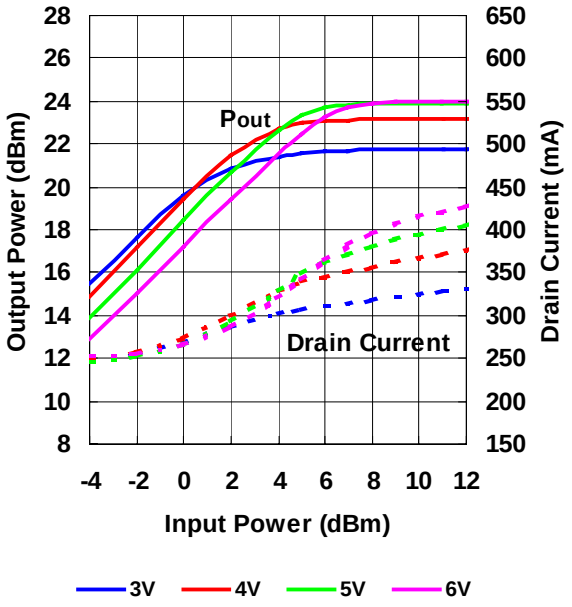
Output Power, Drain Current vs. Input Power by Drain Voltage @ freq.=22GHz, $I_{DD(DC)}$=250mA



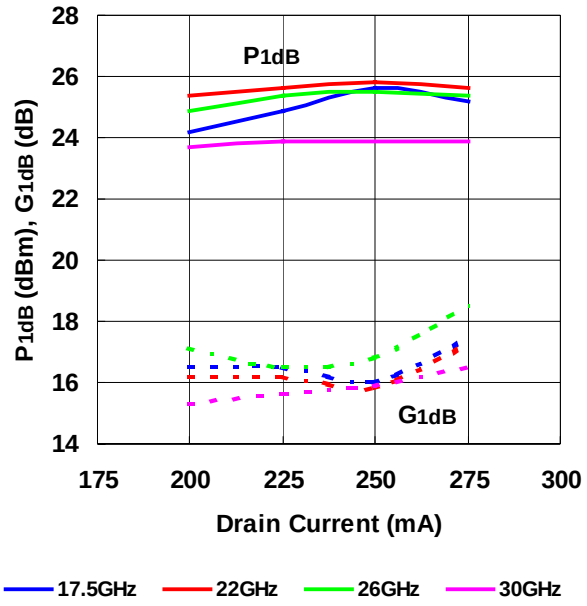
Output Power, Drain Current vs. Input Power by Drain Voltage @ freq.=26GHz, $I_{DD(DC)}$=250mA



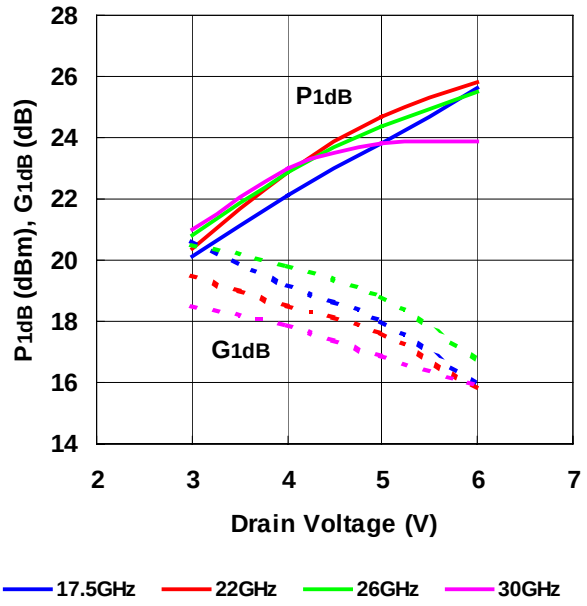
Output Power, Drain Current vs. Input Power by Drain Voltage @ freq.=30GHz, $I_{DD(DC)}$=250mA



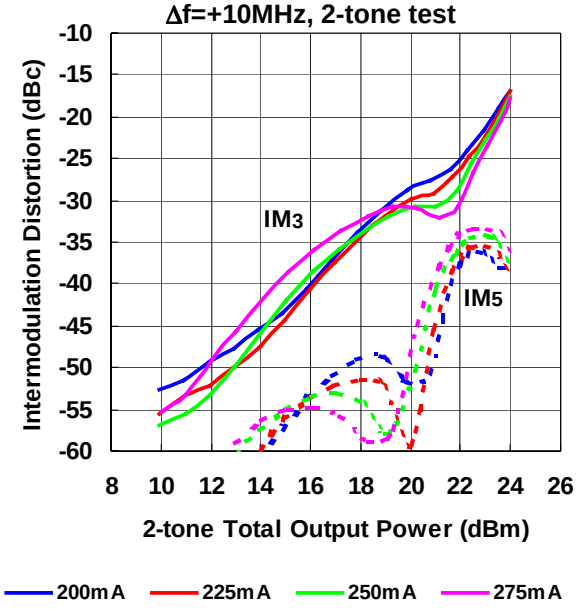
P1dB, G1dB vs. Drain Current
@ freq.=17.5GHz, VDD=6V



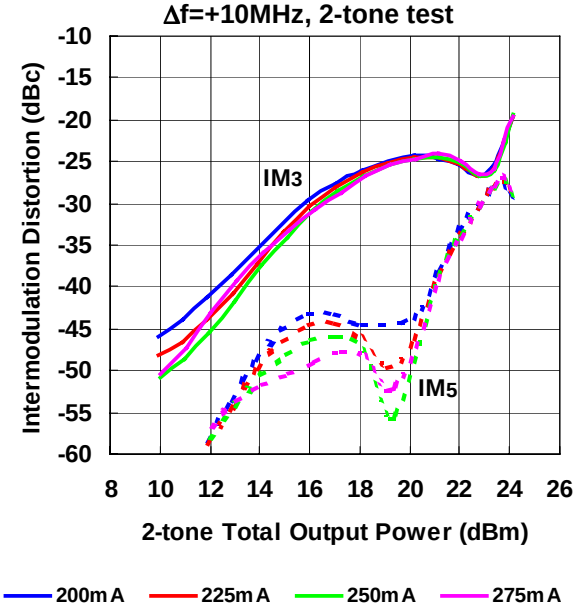
P1dB, G1dB vs. Drain Voltage
@ freq.=22GHz, IDD(DC)=250mA



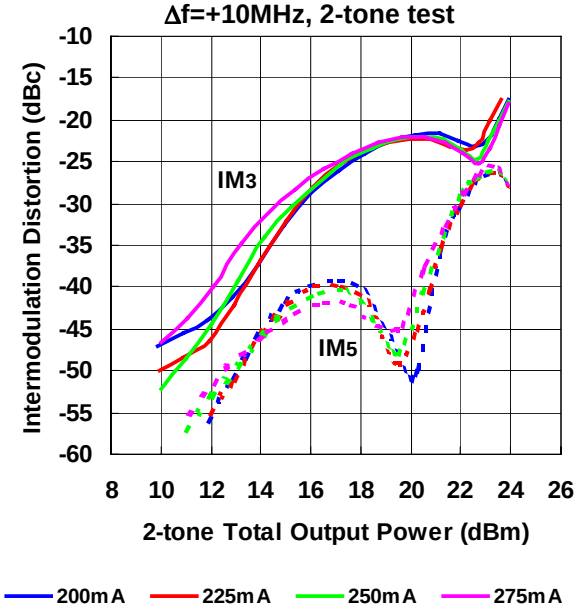
IMD Performance vs. Total Output Power by Drain Current @ freq.=17.5GHz, VDD=6V Δf=+10MHz, 2-tone test



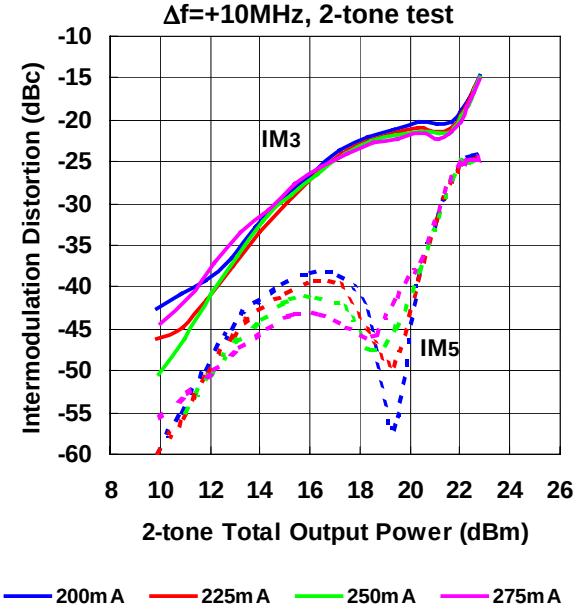
IMD Performance vs. Total Output Power by Drain Current @ freq.=22GHz, VDD=6V Δf=+10MHz, 2-tone test



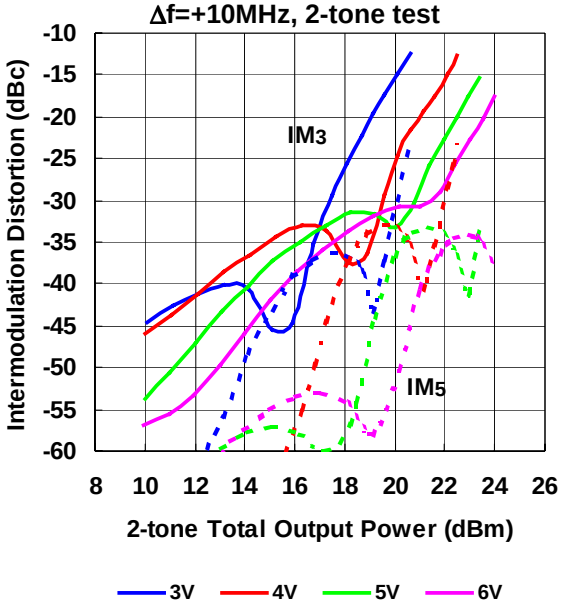
IMD Performance vs. Total Output Power by Drain Current @ freq.=26GHz, VDD=6V Δf=+10MHz, 2-tone test



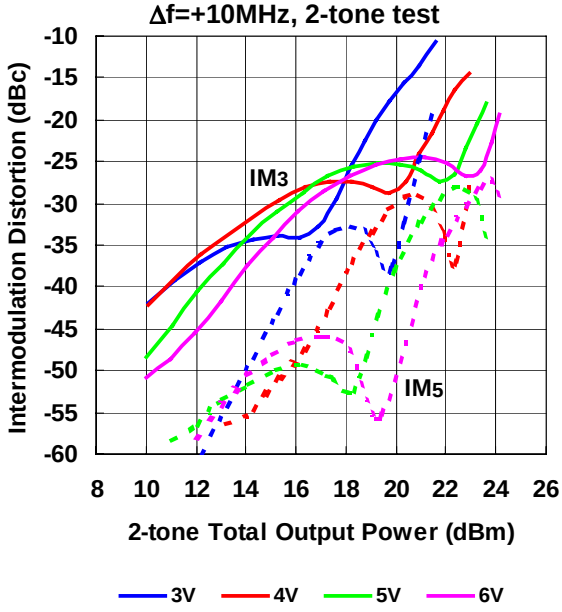
IMD Performance vs. Total Output Power by Drain Current @ freq.=30GHz, VDD=6V Δf=+10MHz, 2-tone test



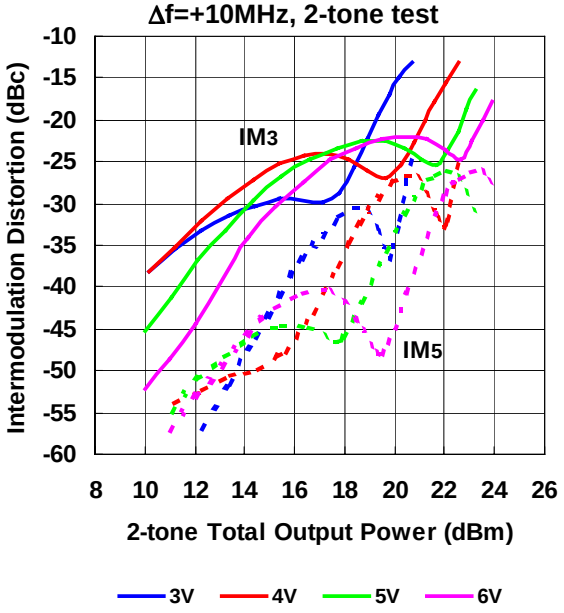
IMD Performance vs. Total Output Power
by Drain Voltage
@ freq.=17.5GHz, IDD(DC)=250mA
Δf=+10MHz, 2-tone test



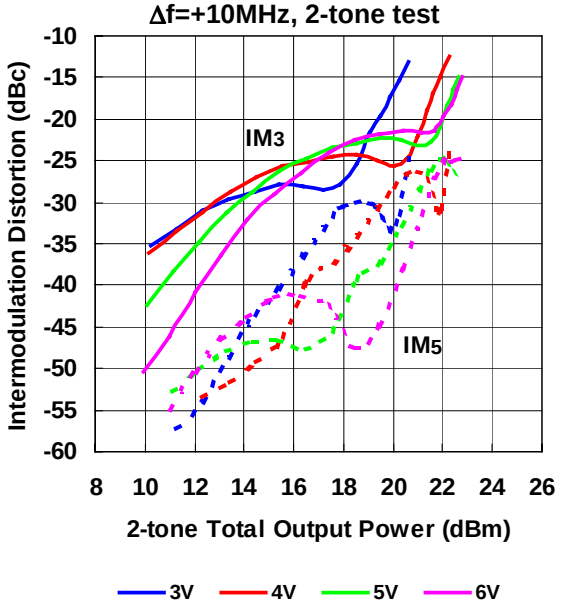
IMD Performance vs. Total Output Power
by Drain Voltage
@ freq.=22GHz, IDD(DC)=250mA
Δf=+10MHz, 2-tone test



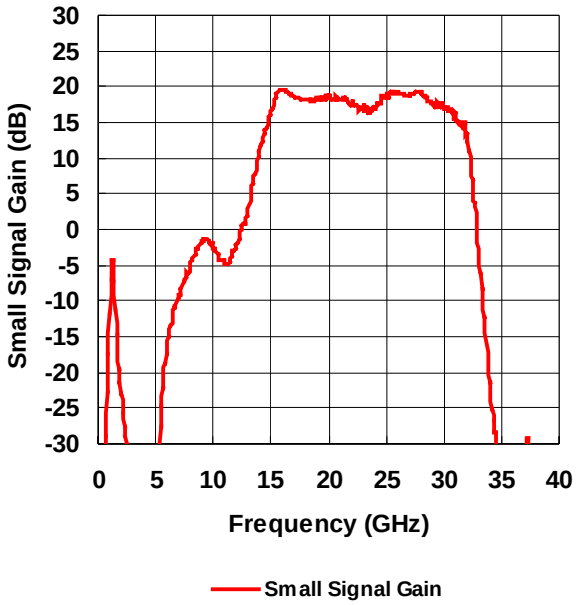
IMD Performance vs. Total Output Power
by Drain Voltage
@ freq.=26GHz, IDD(DC)=250mA
Δf=+10MHz, 2-tone test



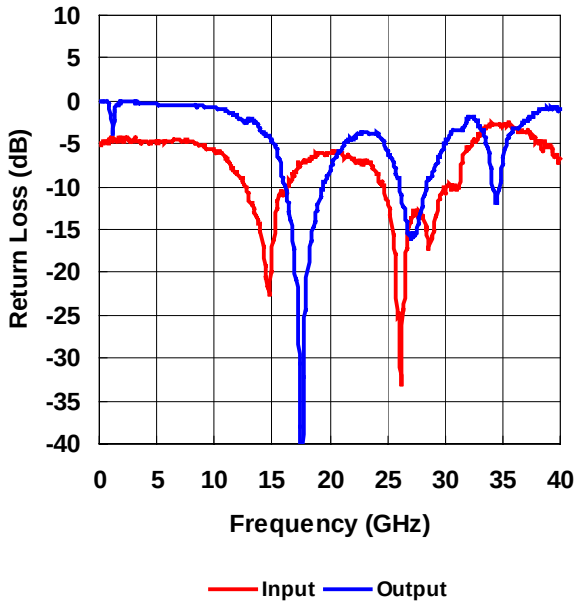
IMD Performance vs. Total Output Power
by Drain Voltage
@ freq.=30GHz, IDD(DC)=250mA
Δf=+10MHz, 2-tone test



Small Signal Gain vs. Frequency
@ VDD=6V, IDD(DC)=250mA



Return Loss vs. Frequency
@ VDD=6V, IDD(DC)=250mA

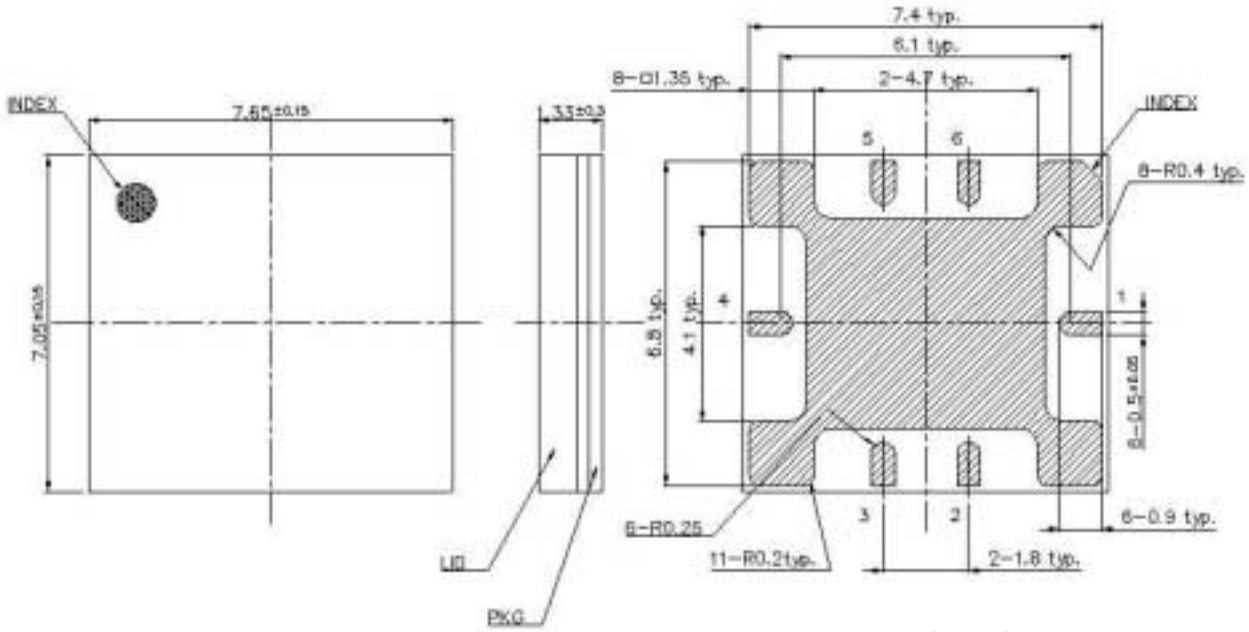


■ S-Parameters

@ V_{DD}=6V, $I_{DD(DC)}$=250mA

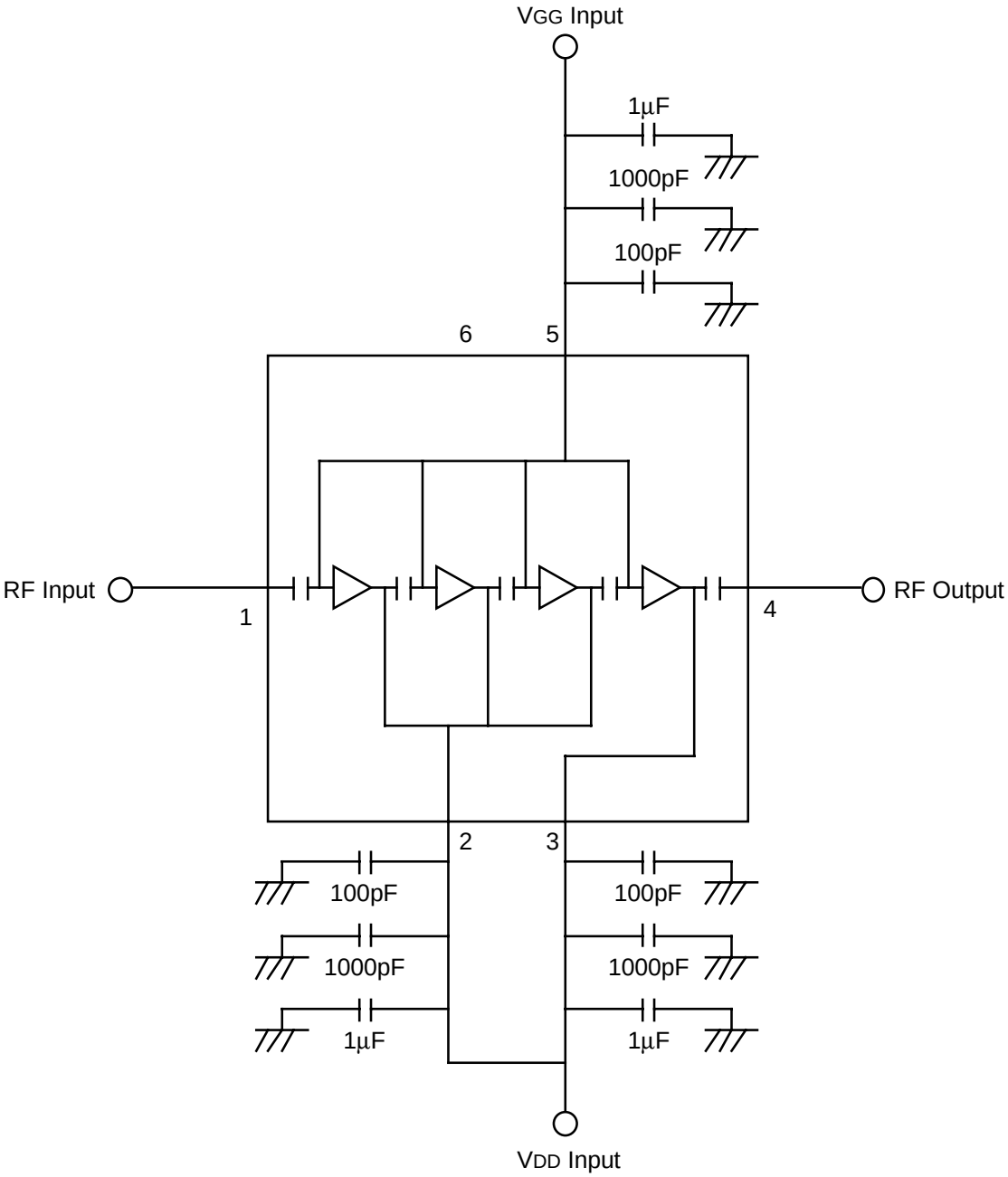
FREQ.	S11		S21		S12		S22	
[MHz]	mag.	ang.	mag.	ang.	mag.	ang.	mag.	ang.
1000	0.607	141.1	0.258	5.5	0.001	-120.2	0.835	-87.5
2000	0.583	100.0	0.070	-4.1	0.000	129.0	0.994	-130.4
3000	0.591	54.5	0.028	-62.0	0.001	-24.5	0.999	172.2
4000	0.577	10.3	0.022	-72.4	0.004	-23.9	0.974	121.5
5000	0.574	-30.7	0.016	-78.4	0.004	-51.4	0.959	71.8
6000	0.582	-70.4	0.154	-94.9	0.005	-72.3	0.947	23.2
7000	0.590	-105.6	0.347	170.6	0.005	-87.7	0.944	-24.5
8000	0.575	-138.3	0.554	84.9	0.006	-94.3	0.947	-68.5
9000	0.552	-169.3	0.820	-2.6	0.005	-107.6	0.938	-109.2
10000	0.506	164.9	0.761	-87.0	0.005	-65.6	0.917	-145.6
11000	0.460	137.2	0.601	-137.9	0.007	-88.3	0.879	-179.5
12000	0.374	109.7	0.771	-169.9	0.007	-103.3	0.809	148.8
13000	0.274	85.5	1.366	142.2	0.009	-95.3	0.790	119.8
14000	0.172	73.4	3.505	73.6	0.007	-99.8	0.681	82.7
15000	0.129	137.6	6.838	-16.2	0.010	-113.4	0.587	46.5
16000	0.290	98.6	9.513	-125.7	0.006	-67.6	0.340	0.8
17000	0.390	68.6	8.599	143.0	0.009	-118.1	0.105	-42.2
18000	0.449	39.5	8.189	63.0	0.006	-102.4	0.084	103.9
19000	0.496	8.2	8.098	-14.0	0.006	-100.4	0.249	66.2
20000	0.503	-24.1	8.316	-93.7	0.007	-99.9	0.397	29.7
21000	0.483	-54.8	8.051	-172.5	0.008	-100.8	0.533	-9.8
22000	0.462	-85.4	7.427	108.2	0.008	-113.5	0.607	-50.5
23000	0.464	-113.8	6.774	32.2	0.009	-149.0	0.662	-89.5
24000	0.378	-145.3	7.104	-36.3	0.006	153.5	0.646	-128.7
25000	0.253	176.0	8.354	-118.1	0.010	46.2	0.506	-179.5
26000	0.057	138.3	9.016	153.5	0.016	7.6	0.345	127.0
27000	0.212	-137.3	8.667	65.2	0.023	-30.1	0.156	82.8
28000	0.209	142.8	9.179	-29.5	0.024	-62.7	0.241	19.3
29000	0.174	62.2	7.605	-126.1	0.018	-65.0	0.393	-42.8
30000	0.287	-24.6	7.114	125.1	0.026	-86.9	0.564	-80.9
31000	0.307	-65.9	6.564	9.4	0.021	-130.5	0.673	-121.1
32000	0.532	-91.7	4.711	-141.2	0.003	-117.6	0.792	-148.9
33000	0.630	-115.8	0.696	59.2	0.018	-50.9	0.712	163.0
34000	0.739	-147.1	0.085	-59.4	0.021	-103.4	0.402	91.2
35000	0.732	-171.0	0.015	-153.7	0.018	-158.0	0.424	-85.2
36000	0.700	170.6	0.019	100.1	0.014	90.6	0.694	-149.9
37000	0.657	148.5	0.030	0.6	0.015	-1.4	0.764	-177.9
38000	0.581	132.1	0.022	-53.3	0.016	-38.7	0.858	158.4
39000	0.545	118.6	0.005	-38.3	0.013	-56.7	0.909	135.9
40000	0.464	97.9	0.013	-64.6	0.010	-63.0	0.887	114.4

■ **Package Outline**



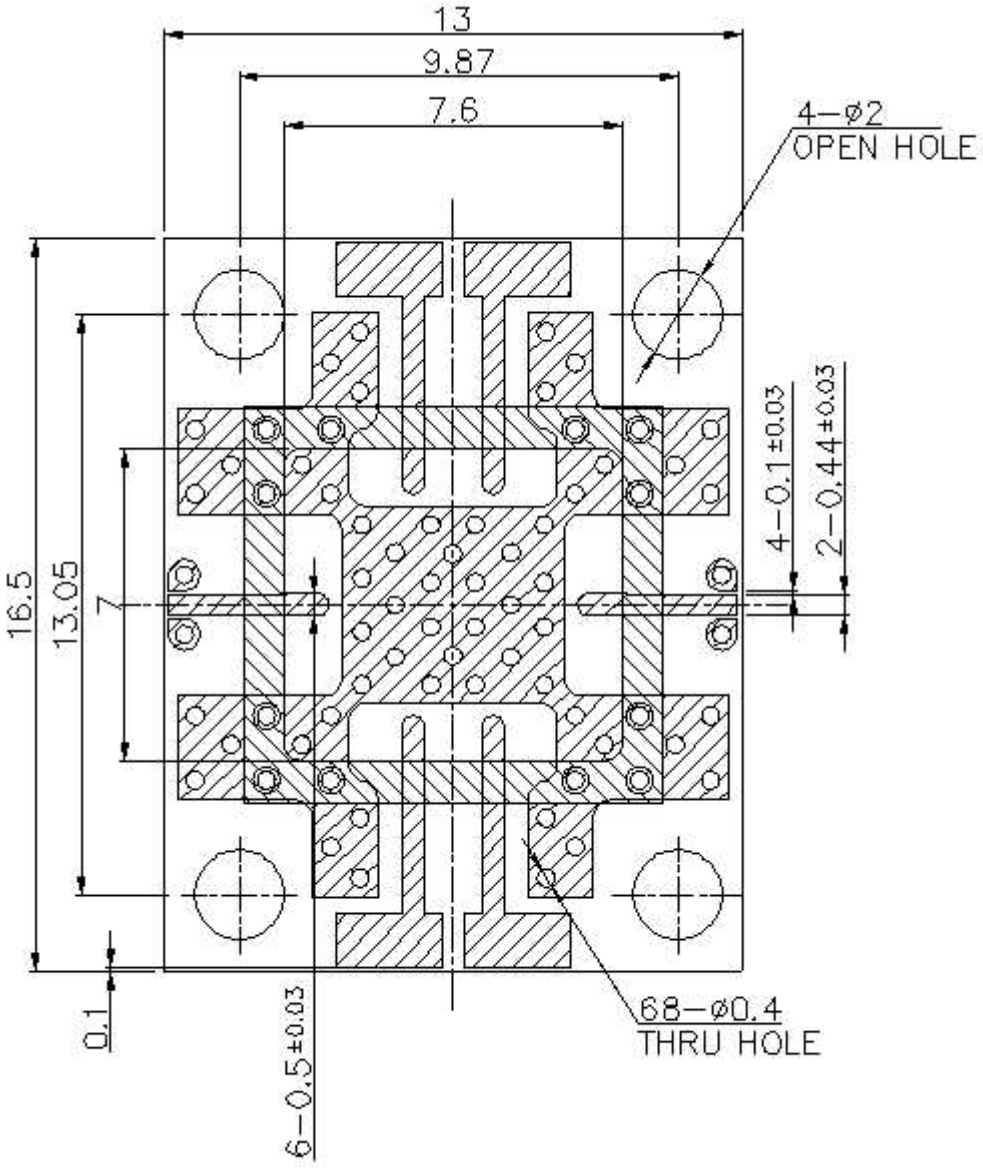
Pin Assignment
1 : RF-in
2 : VDD1
3 : VDD2
4 : RF-out
5 : VGG
6 : N.C.

■ Block Diagram and External Component



Note) : The capacitors are recommended on the bias supply line, close to the package, in order to prevent video oscillations which could damage the module.

■ **Recommended Foot Pattern Layout**



Notes :

1.LAMINATE : Rogers Corporation RO4003, Thickness t=0.2mm, Cu Foil 18 μm

2. ▨ : Finish to copper foil ; Ni 0.1 μm min./Au 0.1±0.08 μm (Both side)

3. ▨ : Resist

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CAUTION

Eudyna Devices 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.