■ Features

- High Power GaN HEMT for DC to 3GHz
- High Power: 102W @ 3GHz
- High Efficiency: 56% @ 3GHz
- CW Operable
- Broad Band Operation
- Small Footprint Flange-mount Package

■ Description

Sumitomo Electric's GaN-HEMT SGCA101M1R offers high power, high efficiency, ease of matching and greater consistency for DC to 3GHz high power applications with 50V operation.

ABSOLUTE MAXIMUM RATINGS (Case Temperature T_c=25deg.C)

Item	Symbol	Condition	Rating	Unit
Operating-Voltage	V_{DS}		55	V
Drain-Source Voltage	V_{DS}	V_{GS}=-10V	200	V
Gate-Source Voltage	V_{GS}		-15	V
Total Power Dissipation	Pt		156	W
Storage Temperature	T_{stg}		-55 to +125	deg.C
Channel Temperature	T_{ch}		+250	deg.C

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	V_{DS}		≤50	V
Forward Gate Current	I_{GF}	R_G=51ohm	≤44.9	mA
Reverse Gate Current	I_{GR}	R_G=51ohm	≥-4	mA
Channel Temperature	T_{ch}		<+200	deg.C
Output Power	P_{out}		≤P5dB	dBm

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

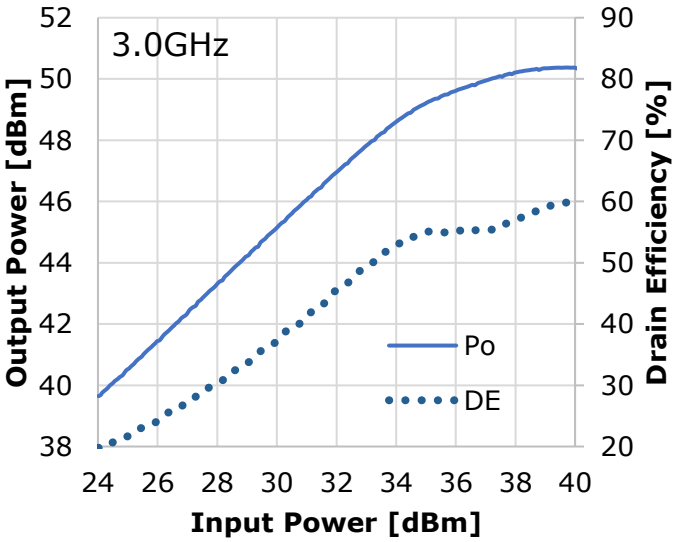
Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-off Voltage	V_P	V_{DS}=50V, I_{DS}=5.9mA	-	-4.5	-	V
Saturated Power	P_{sat}	V_{DS}=50V , $I_{DS(DC)}$=650mA	49.1	50.1	-	dBm
Drain Efficiency	DE	f=3GHz , Pin=38dBm	-	56	-	%
Power Gain	Gp	PW=200µsec. , Duty=10%	-	12.1	-	dB
Thermal Resistance	R_{th}	Channel to Case P_{DC}=32.7W	-	1.2	1.44	deg.C/W

Case Style	M1R	
RoHS Compliance	YES	
ESD *	Class 1C	1000V to < 2000V

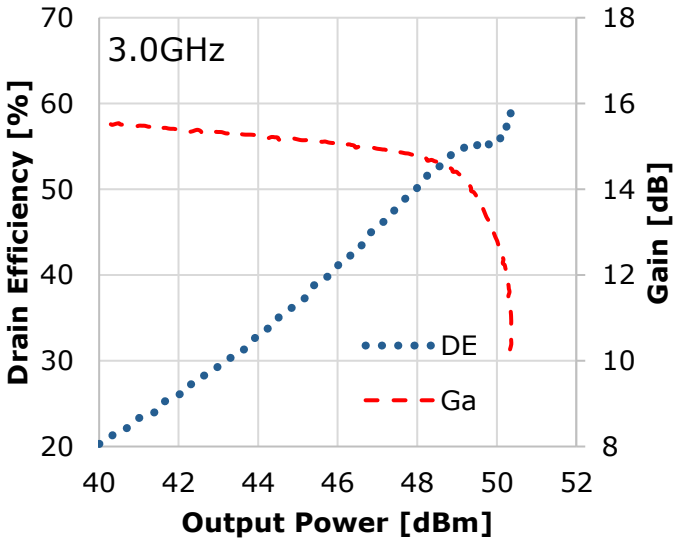
* Based on ANSI/ESDA/JEDEC JS-001 (C=100pF, R=1.5kohm)

■ RF Characteristics

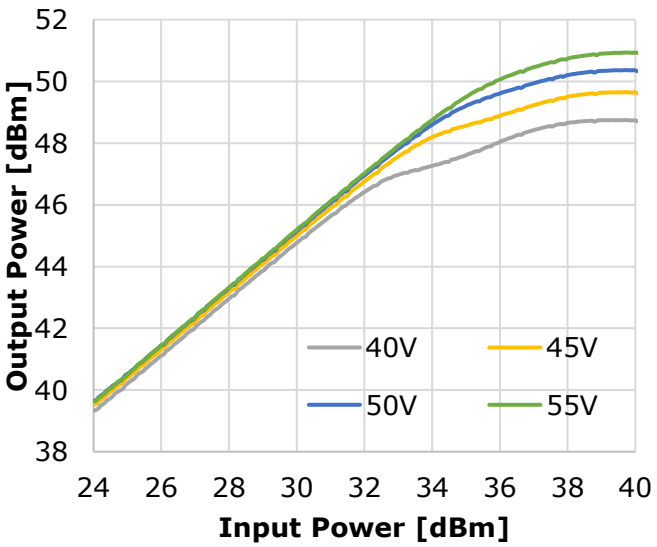
Output Power & Drain Efficiency vs. Input Power
V_{DS}=50V, $I_{DS(DC)}$=0.65A
PW=200µsec., Duty=10%



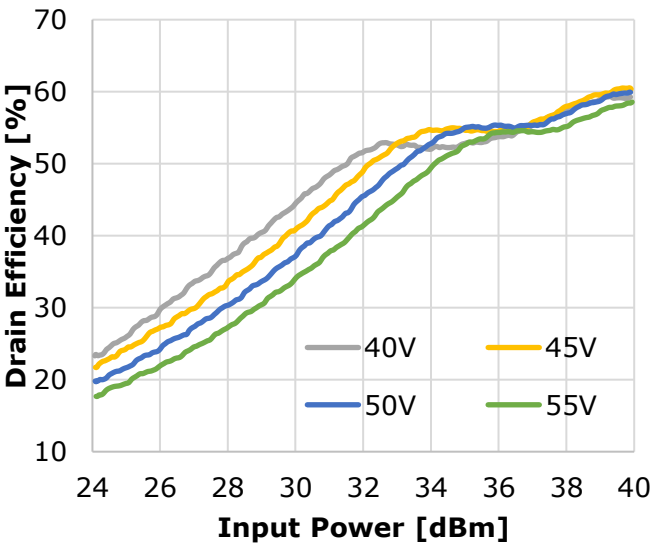
Drain Efficiency & Gain vs. Output Power
V_{DS}=50V, $I_{DS(DC)}$=0.65A
PW=200µsec., Duty=10%



Output Power vs. Input Power by Drain Voltage
f=3.0GHz, $I_{DS(DC)}$=0.65A
PW=200µsec., Duty=10%

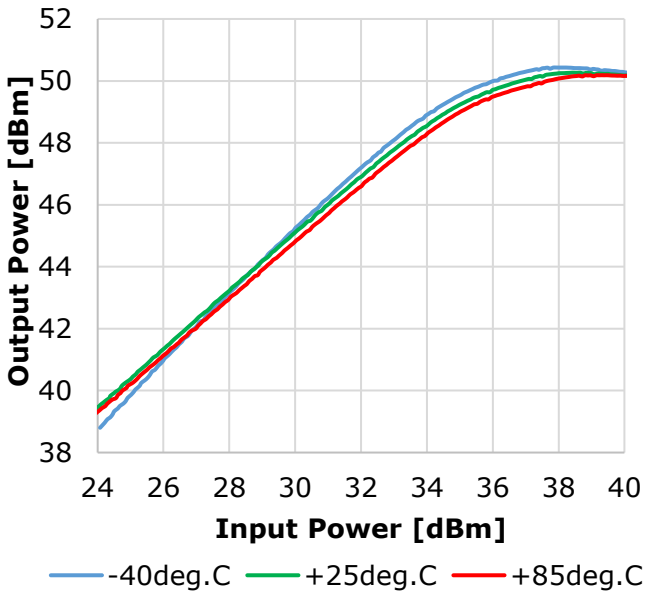


Drain Efficiency vs. Input Power by Drain Voltage
f=3.0GHz, $I_{DS(DC)}$=0.65A
PW=200µsec., Duty=10%

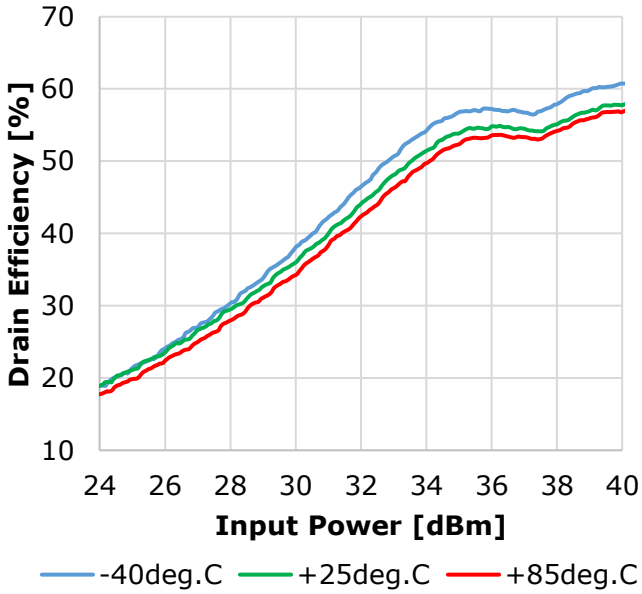


■ RF Characteristics

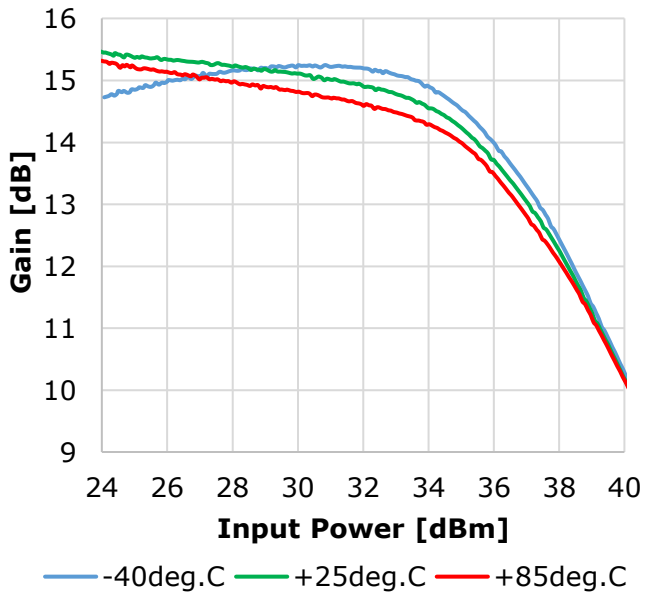
Output Power vs. Input Power
by case temperature
f=3.0GHz, V_{DS}=50V, $I_{DS(DC)}$=0.65A
PW=200µsec., Duty=10%



Drain Efficiency vs. Input Power
by case temperature
f=3.0GHz, V_{DS}=50V, $I_{DS(DC)}$=0.65A
PW=200µsec., Duty=10%

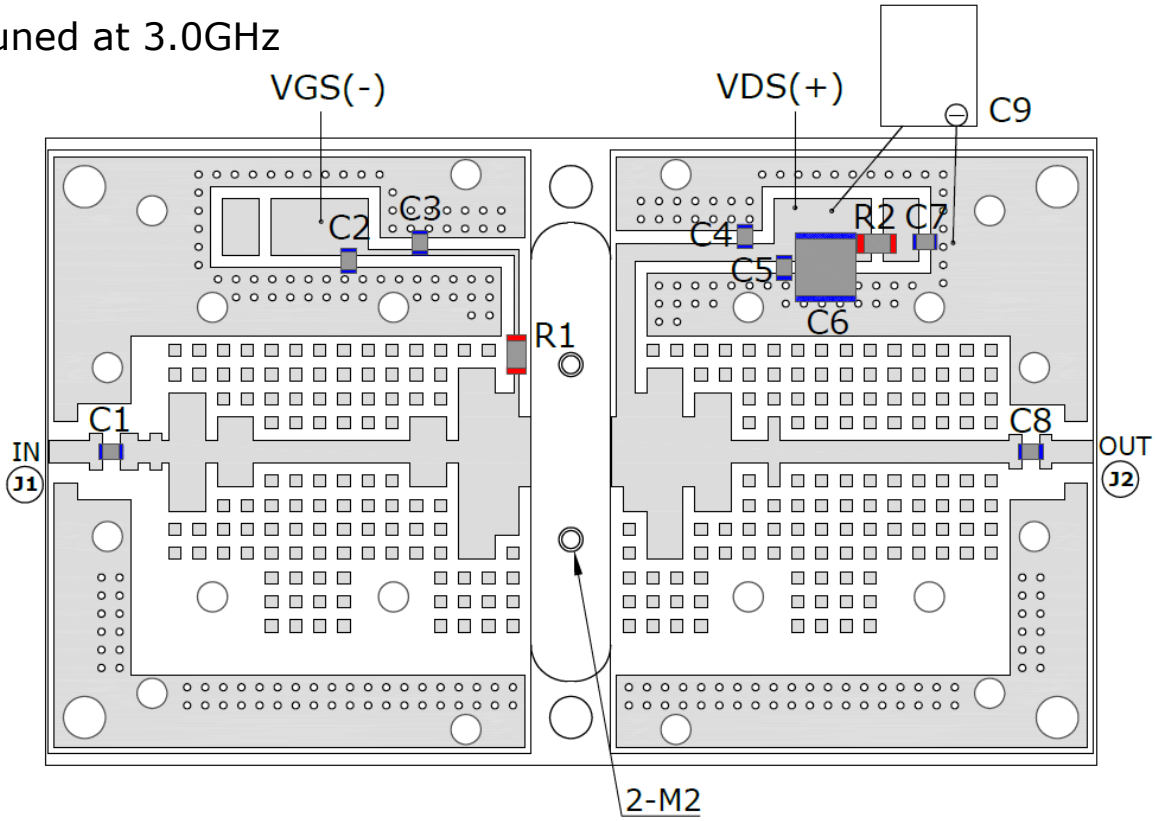


Gain vs. Input Power
by case temperature
f=3.0GHz, V_{DS}=50V, $I_{DS(DC)}$=0.65A
PW=200µsec., Duty=10%



SGCA101M1H/M1R Evaluation Board Assembly Drawing

Tuned at 3.0GHz



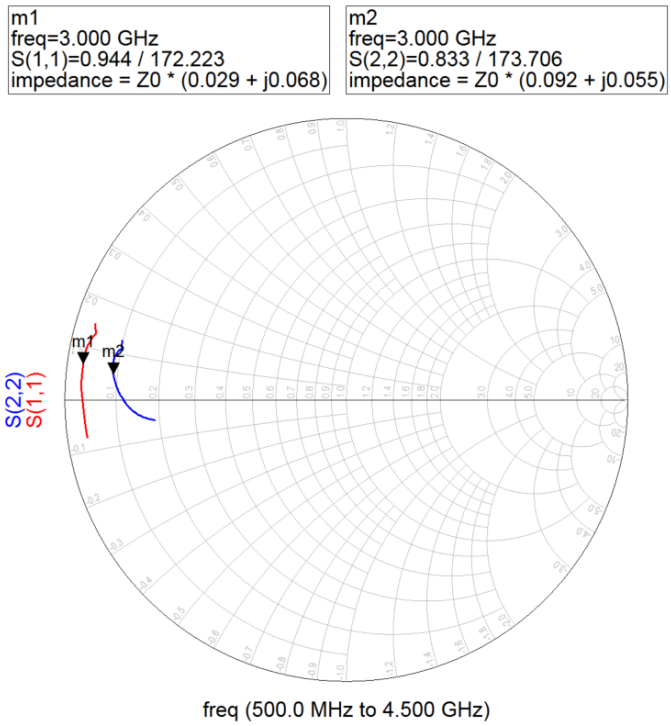
*The DXF file is available. Please contact your local sales team.

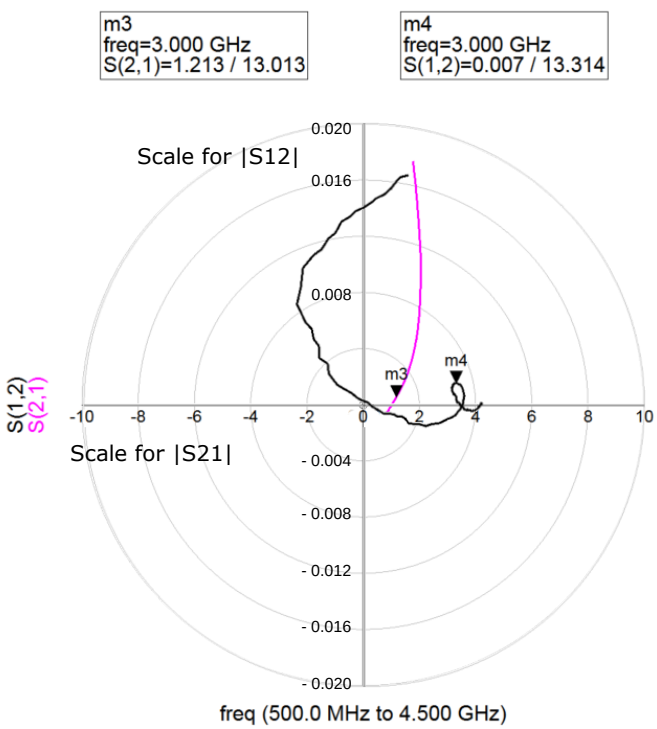
Bill of Materials

Part Index	Description	Size	Manufacturer	Part Number
C1, C3, C4, C8	5pF	2012M	Murata	GQM2195C2E5R0CB12
C2, C5, C7	1000pF	2012M	Murata	GRM21AR72E102KW01L
C6	4.7μF	5750M	Murata	GRM55ER72A475KA01L
C9	470μF	-	Nippon Chemi-con	EKZN800ELL471ML20S
R1, R2	51ohm	3216M	Rohm	ESR18EZPJ510
PCB	t=0.8mm, er=3.3, Cu thickness=18 μm	-	RISHO KOGYO	CS3376C
J1, J2	Connector SMA female	-	WAKA Manufacturing	01K0936-30

■ S-parameters

V_{DS}=50V, $I_{DS(DC)}$=0.65A, f=0.5 to 4.5GHz, Zl=Zs=50 ohm, Marker: 3.0GHz



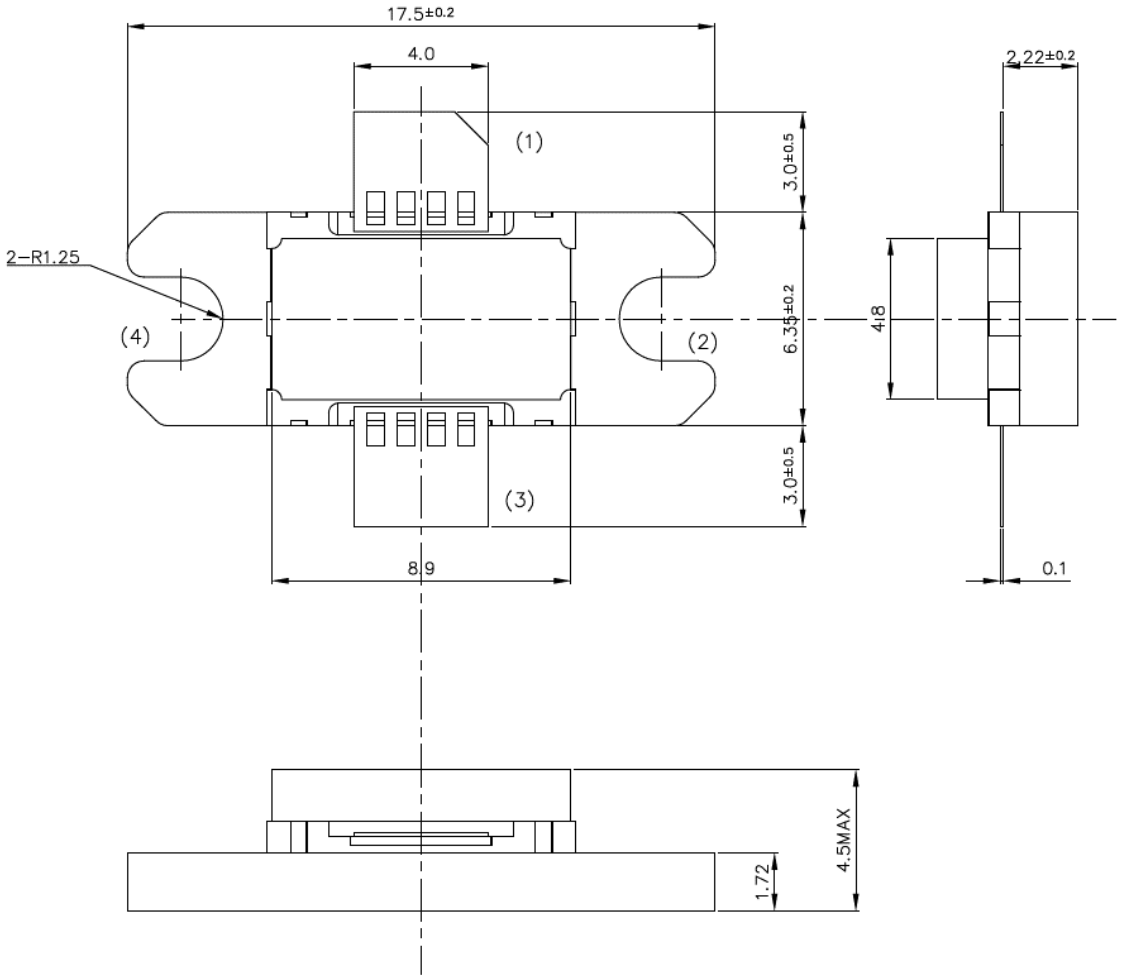


Freq.	S11		S21		S12		S22		K	MaxGain *
[GHz]	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		[dB]
0.5	0.930	-171.8	8.824	78.3	0.008	0.8	0.685	-174.0	0.252	30.2
0.6	0.930	-173.4	7.300	74.6	0.008	-0.2	0.692	-174.2	0.308	29.4
0.7	0.932	-174.6	6.214	71.0	0.008	-1.1	0.699	-174.4	0.353	28.8
0.8	0.933	-175.6	5.391	67.7	0.008	-2.1	0.707	-174.5	0.396	28.2
0.9	0.933	-176.3	4.748	64.4	0.008	-2.5	0.714	-174.8	0.466	27.8
1.0	0.933	-177.0	4.226	61.3	0.008	-3.0	0.722	-175.1	0.541	27.4
1.1	0.934	-177.7	3.807	58.3	0.008	-3.0	0.728	-175.3	0.595	27.0
1.2	0.935	-178.2	3.450	55.4	0.007	-2.2	0.736	-175.7	0.672	26.7
1.3	0.936	-178.7	3.152	52.5	0.007	-2.7	0.744	-176.1	0.737	26.4
1.4	0.937	-179.3	2.893	49.8	0.007	-1.4	0.751	-176.6	0.805	26.1
1.5	0.938	-179.8	2.670	47.1	0.007	-1.1	0.759	-177.0	0.864	25.8
1.6	0.938	179.7	2.474	44.5	0.007	-0.3	0.766	-177.5	0.951	25.6
1.7	0.939	179.2	2.303	41.9	0.007	0.9	0.773	-178.1	0.984	25.3
1.8	0.940	178.8	2.156	39.5	0.007	1.6	0.780	-178.6	1.022	24.1
1.9	0.941	178.3	2.023	36.9	0.007	2.9	0.786	-179.4	1.077	23.2
2.0	0.942	177.8	1.906	34.5	0.007	3.6	0.792	-180.0	1.088	22.8
2.1	0.942	177.2	1.796	32.2	0.007	4.7	0.797	179.4	1.165	21.9
2.2	0.942	176.7	1.702	29.9	0.007	5.3	0.803	178.8	1.201	21.4
2.3	0.943	176.2	1.613	27.6	0.007	5.9	0.809	178.1	1.237	21.0
2.4	0.943	175.6	1.538	25.5	0.007	6.8	0.812	177.4	1.275	20.6
2.5	0.944	175.1	1.469	23.3	0.006	7.6	0.817	176.8	1.320	20.2
2.6	0.944	174.5	1.406	21.1	0.006	8.6	0.821	176.1	1.391	19.7
2.7	0.943	174.0	1.350	19.1	0.006	10.7	0.824	175.5	1.474	19.2
2.8	0.943	173.4	1.298	17.0	0.006	11.8	0.827	174.9	1.476	18.9
2.9	0.943	172.9	1.254	15.0	0.007	12.8	0.831	174.3	1.488	18.7
3.0	0.944	172.2	1.213	13.0	0.007	13.3	0.833	173.7	1.460	18.5
3.1	0.944	171.6	1.175	11.0	0.007	12.6	0.835	173.1	1.422	18.5
3.2	0.943	171.0	1.141	9.0	0.007	11.5	0.837	172.4	1.403	18.3
3.3	0.943	170.3	1.112	7.0	0.007	8.7	0.838	171.7	1.407	18.1
3.4	0.943	169.5	1.086	5.1	0.007	4.0	0.839	171.1	1.445	17.9
3.5	0.941	168.8	1.061	3.0	0.007	-4.5	0.839	170.3	1.640	17.3
3.6	0.938	168.1	1.038	0.8	0.006	-13.4	0.837	169.6	2.352	16.2
3.7	0.934	167.4	1.013	-1.1	0.004	-20.4	0.834	168.9	4.158	15.0
3.8	0.932	166.8	0.991	-3.0	0.002	-17.2	0.831	168.3	8.596	14.2
3.9	0.929	166.2	0.971	-4.9	0.000	31.0	0.826	167.7	69.163	13.4
4.0	0.925	165.6	0.953	-6.4	0.002	143.2	0.821	167.3	11.193	12.5
4.1	0.920	165.2	0.940	-8.0	0.006	127.5	0.818	167.1	5.213	11.9
4.2	0.919	165.0	0.933	-9.5	0.011	114.2	0.817	167.0	3.117	11.6
4.3	0.924	164.5	0.929	-11.5	0.013	97.1	0.820	166.6	2.284	12.1
4.4	0.928	163.9	0.922	-13.8	0.015	86.7	0.822	166.0	1.839	12.7
4.5	0.932	163.2	0.906	-16.0	0.017	79.3	0.823	165.3	1.484	13.3

*MaxGain : if k <= 1, then k = 1 is used.

● Package Outline

Case Style : M1R
Metal-Ceramic Hermetic Package



1 : GATE
2 : SOURCE(Flange)
3 : DRAIN
4 : SOURCE(Flange)

Unit : mm
Tolerance : ±0.15

Notes & Disclaimer

- 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.

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