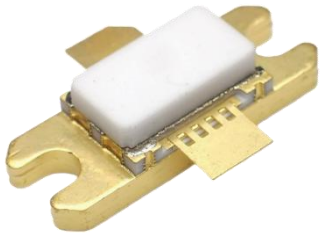
■ Features



- High Power GaN HEMT for DC to 3GHz
- High Power : 154W @ 3GHz
- High Efficiency: 56.5% @ 3GHz
- CW Operable
- Easy of Matching: Input Pre-matched for 3GHz
- Small Footprint Flange-mount Package

■ Description

Sumitomo Electric's GaN-HEMT SGNL130M1R offers high power, high efficiency, ease of matching and greater consistency for DC to 3GHz high power applications with 50V operation.

ABSOLUTE MAXIMUM RATING

Item	Symbol	Rating	Unit
Operating Voltage	V_{DS}	55	V
Drain-Source Voltage	V_{DS}	200 @ V_{GS}-8V	V
Gate-Source Voltage	V_{GS}	-15	V
Total Power Dissipation	P_t	170 @T_c=25deg.C	W
Storage Temperature	T_{stg}	-55 to +125	deg.C
Channel Temperature	T_{ch}	+250	deg.C

RECOMMENDED OPERATING CONDITION(Case Temperature T_c=25 deg.C)

Item	Symbol	Condition	Limit	Unit
Drain-Source Voltage	V_{DS}		≤50	V
Forward Gate Current	I_{GF}	Rg=12ohm	≤76	mA
Reverse Gate Current	I_{GR}	Rg=12ohm	≥-5.2	mA
Channel Temperature	T_{ch}		≤200	deg.C

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

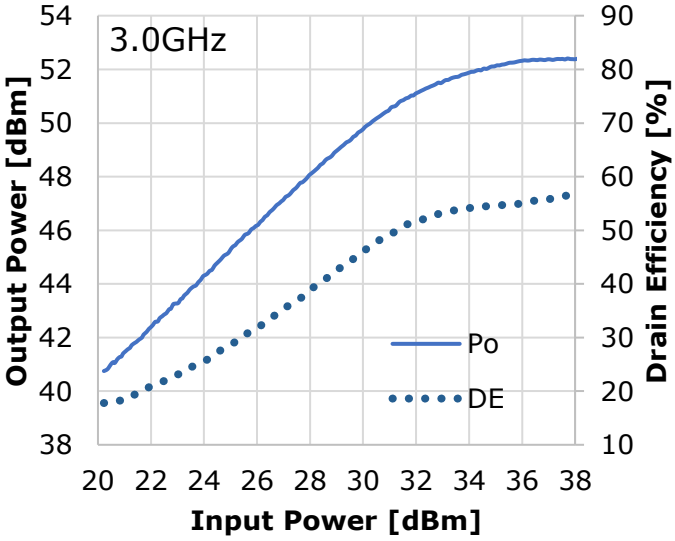
Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-off Voltage	V_P	V_{DS}=50V, I_{DS}=28mA	-4.0	-2.5	-1.5	V
Saturated Power	P_{sat}	V_{DS}=50V, $I_{DS(DC)}$=500mA, Pin=36dBm, f=3GHz, PW=200µs, Duty=10%	51.1	51.9	-	dBm
Drain Efficiency	DE		50.0	56.5	-	%
Power Gain	G_P		-	15.9	-	dB
Thermal Resistance	R_{th}	Channel to Case at 90W P_{DC}	-	1.1	1.32	deg.C/W

Case Style	M1R	
RoHS Compliance	YES	
ESD *	Class 3A	4000V to < 8000V

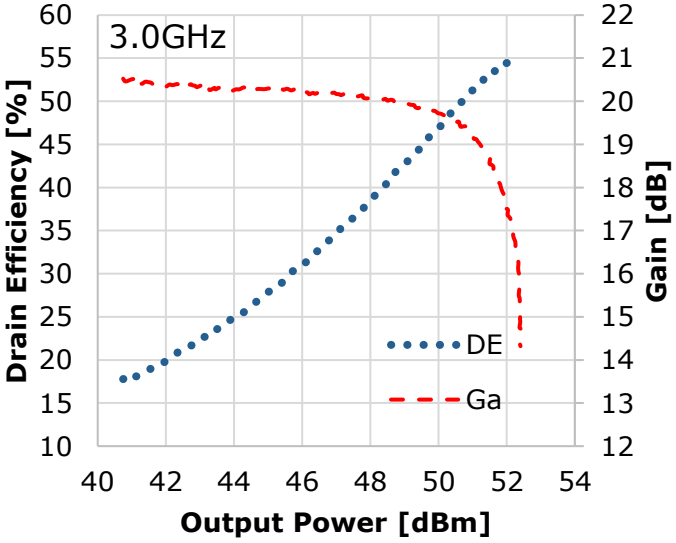
* Based on ANSI/ESDA/JEDEC JS-001 (C=100pF, R=1.5kohm)

■ RF Characteristics

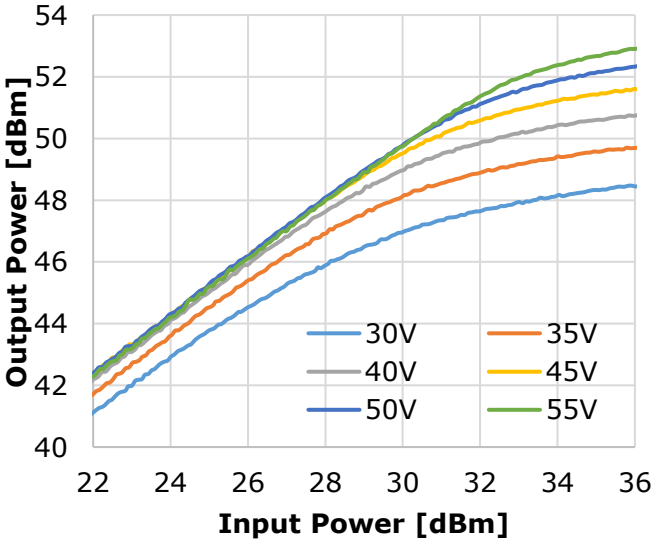
Output Power & Drain Efficiency vs. Input Power
V_{DS}=50V, $I_{DS(DC)}$=0.5A
PW=200µsec., Duty=10%



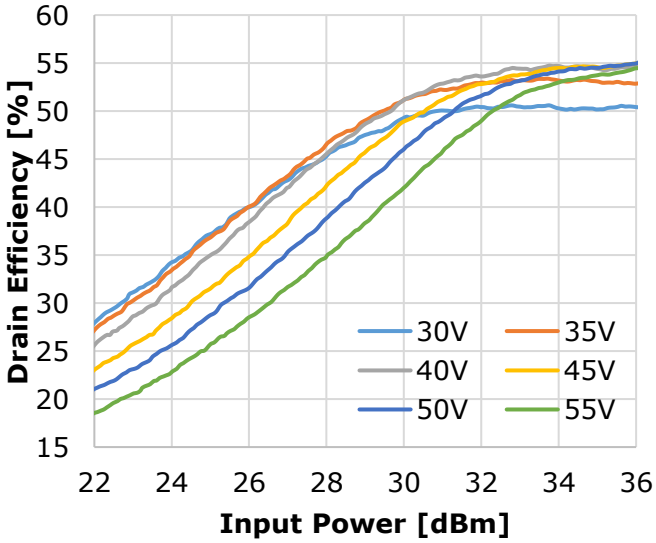
Drain Efficiency & Gain vs. Output Power
V_{DS}=50V, $I_{DS(DC)}$=0.5A
PW=200µsec., Duty=10%



Output Power vs. Input Power by Drain Voltage
f=3.0GHz, $I_{DS(DC)}$=0.5A
PW=200µsec., Duty=10%

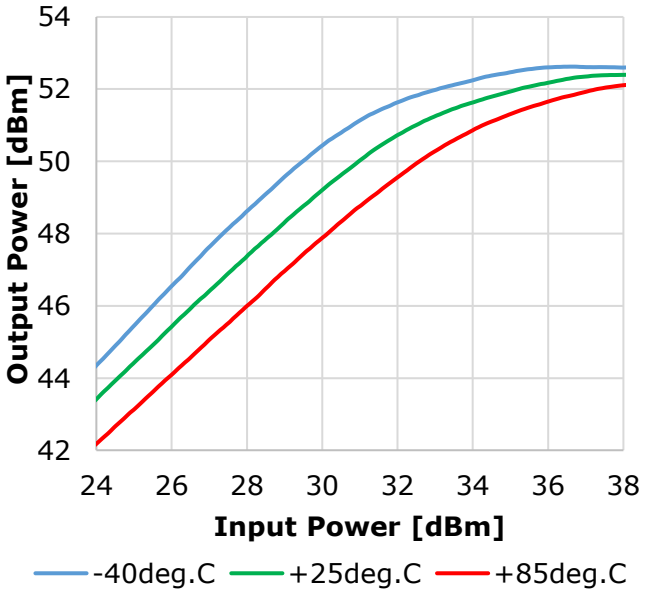


Drain Efficiency vs. Input Power by Drain Voltage
f=3.0GHz, $I_{DS(DC)}$=0.5A
PW=200µsec., Duty=10%

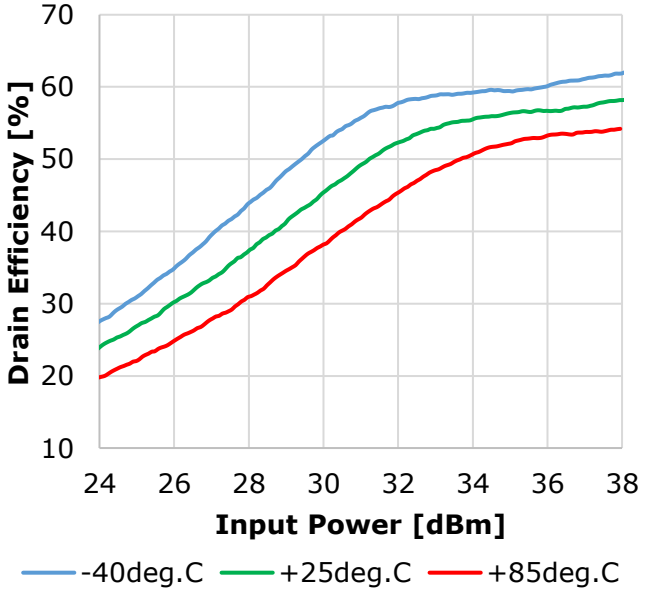


■ RF Characteristics

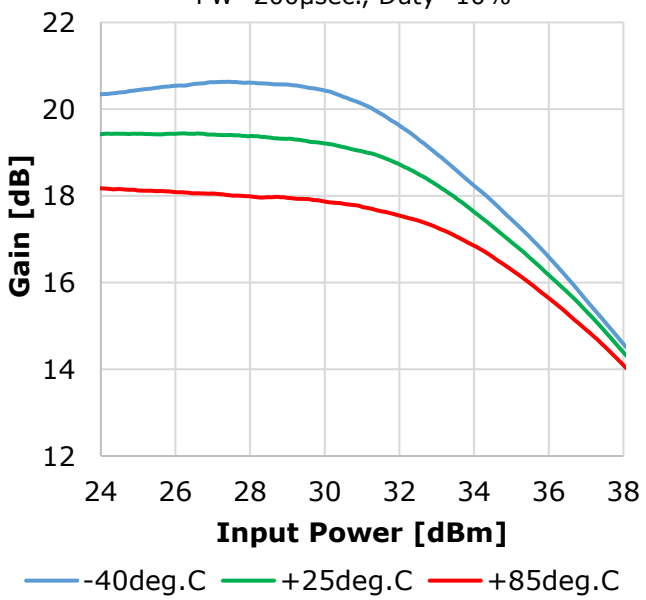
Output Power vs. Input Power
by case temperature
f=3.0GHz, V_{DS}=50V, $I_{DS(DC)}$=0.5A
PW=200µsec., Duty=10%



Drain Efficiency vs. Input Power
by case temperature
f=3.0GHz, V_{DS}=50V, $I_{DS(DC)}$=0.5A
PW=200µsec., Duty=10%

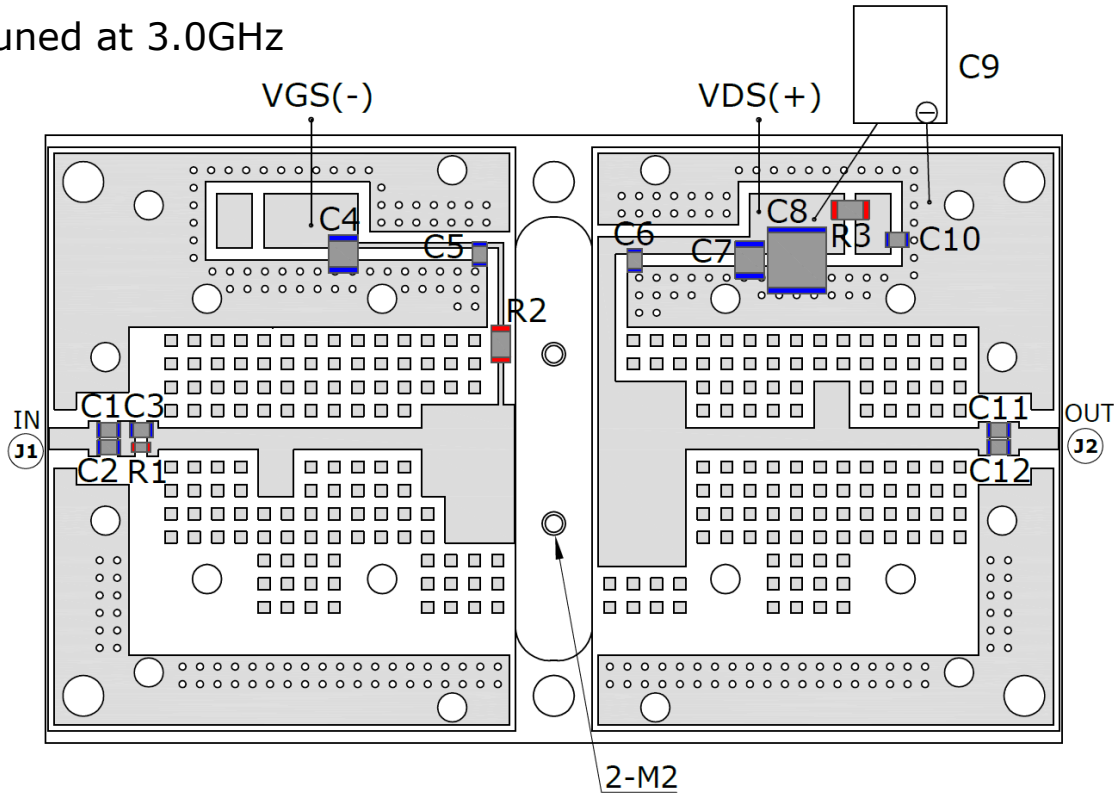


Gain vs. Input Power
by case temperature
f=3.0GHz, V_{DS}=50V, $I_{DS(DC)}$=0.5A
PW=200µsec., Duty=10%



SGNL130M1H/M1R Evaluation Board Assembly Drawing

Tuned at 3.0GHz



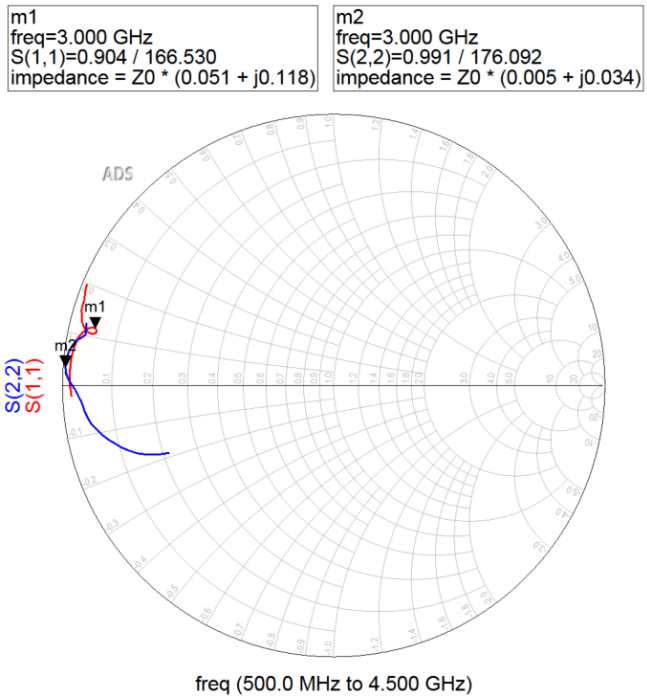
*dxf file is available. Please contact your local sales team.

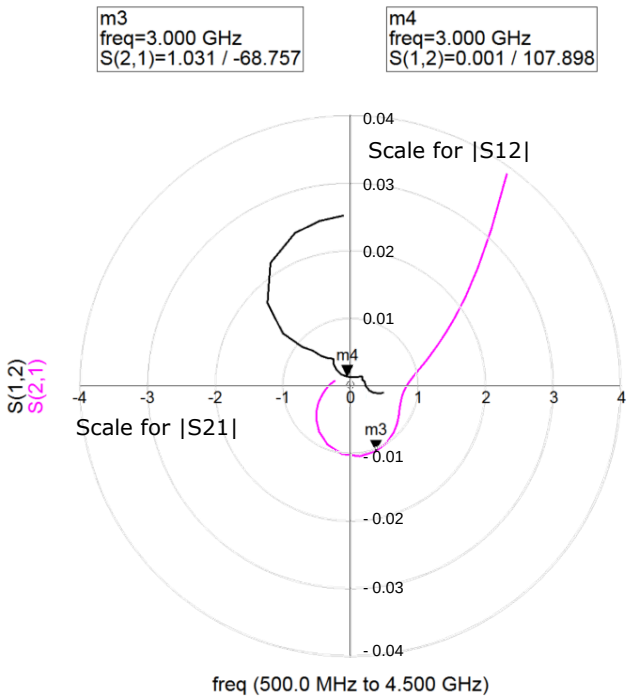
Bill of Materials

Part Index	Description	Size	Manufacturer	Part Number
C1, C2, C5, C6, C11, C12	10 pF	2012M	Murata	GRM21A5C2E100JW01D
C3	5 pF	2012M	Murata	GQM2195C2E5R0CB12D
C4, C7	0.02 µF	3225M	Murata	GRM32DR72E334KW01L
C8	4.7 µF	5750M	Murata	GRM55ER72A475KA01L
C9	39 µF	-	Nippon Chemi-con	EKZE101ELL390MH15D
C10	1000 µF	2012M	Murata	GRM2195C2A102JA01D
R1	100 ohm	1608M	Rohm	MCR18EZPJ101
R2	5.1 ohm	3216M	Rohm	MCR18EZHJ5R1
R3	51 ohm	3216M	Rohm	MCR18EZHJ510
PCB	t=0.8mm, er=3.3, Cu thickness=18 µm	-	RISHO KOGYO	CS-3376C
J1, J2	Connector SMA female	-	WAKA Manufacturing	01K0936-30

■ S-parameters

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



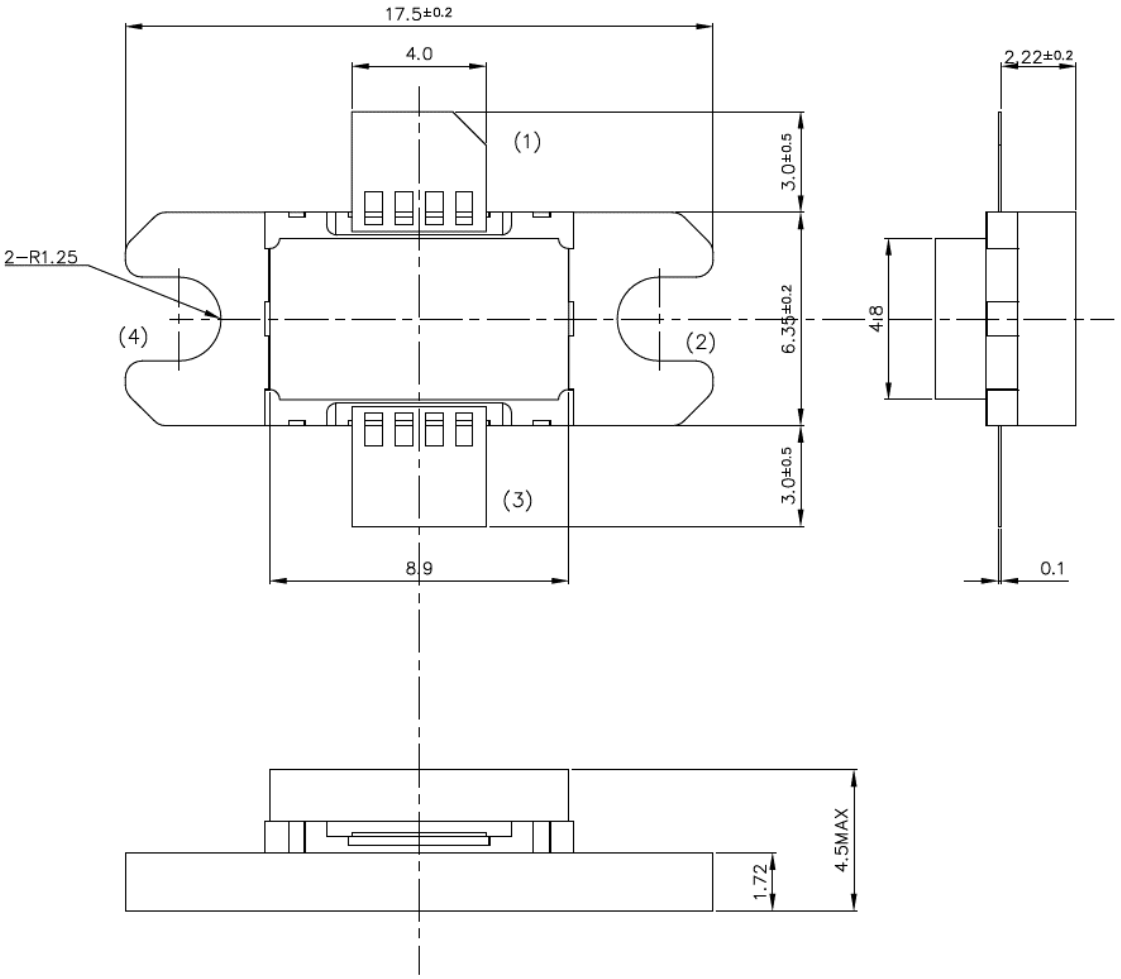


Freq.	S11		S21		S12		S22		K	MaxGain*
[GHz]	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		[dB]
0.5	0.968	-177.8	3.882	53.6	0.005	-12.4	0.658	-157.8	0.333	28.9
0.6	0.969	-178.7	3.107	48.1	0.005	-14.5	0.698	-158.6	0.441	28.3
0.7	0.971	-179.4	2.557	42.8	0.004	-15.9	0.735	-159.8	0.477	27.7
0.8	0.973	179.9	2.157	38.0	0.004	-15.8	0.767	-161.0	0.522	27.2
0.9	0.973	179.2	1.851	33.5	0.004	-16.4	0.793	-162.4	0.641	26.9
1.0	0.973	178.6	1.616	29.4	0.003	-16.6	0.816	-163.8	0.757	26.6
1.1	0.973	178.0	1.430	25.4	0.003	-15.5	0.835	-165.2	0.945	26.5
1.2	0.973	177.4	1.282	21.7	0.003	-14.0	0.853	-166.4	1.133	24.3
1.3	0.975	176.9	1.165	18.2	0.003	-10.3	0.869	-167.7	1.122	24.3
1.4	0.974	176.3	1.066	14.8	0.002	-4.4	0.881	-168.8	1.451	22.5
1.5	0.973	175.7	0.989	11.5	0.002	1.1	0.892	-169.8	1.585	22.0
1.6	0.973	175.1	0.930	8.3	0.002	8.4	0.902	-170.7	1.534	21.9
1.7	0.972	174.4	0.881	5.1	0.002	12.5	0.910	-171.8	1.510	21.7
1.8	0.972	173.8	0.844	1.9	0.002	15.5	0.916	-172.8	1.474	21.6
1.9	0.970	173.2	0.814	-1.5	0.002	19.1	0.923	-174.0	1.683	21.1
2.0	0.970	172.5	0.792	-5.0	0.002	26.8	0.928	-175.3	1.869	20.7
2.1	0.968	171.8	0.778	-8.6	0.002	33.3	0.933	-176.4	1.659	20.8
2.2	0.965	171.1	0.774	-12.4	0.002	35.2	0.940	-177.4	1.488	21.2
2.3	0.962	170.4	0.775	-16.7	0.002	35.8	0.948	-178.5	1.363	21.8
2.4	0.958	169.6	0.785	-21.2	0.002	38.9	0.954	-179.2	1.357	22.1
2.5	0.953	168.8	0.805	-26.2	0.002	41.0	0.961	-179.8	1.324	22.6
2.6	0.947	168.1	0.838	-32.1	0.002	44.5	0.968	179.6	1.246	23.5
2.7	0.938	167.5	0.882	-38.8	0.002	49.3	0.975	179.0	1.208	24.5
2.8	0.928	166.9	0.935	-47.0	0.001	60.5	0.981	178.4	1.118	25.9
2.9	0.916	166.5	0.989	-56.9	0.001	78.1	0.987	177.4	0.927	28.9
3.0	0.904	166.5	1.031	-68.8	0.001	107.9	0.991	176.1	0.670	28.7
3.1	0.897	166.9	1.044	-82.4	0.002	128.6	0.990	174.6	0.479	27.0
3.2	0.898	167.6	1.009	-97.2	0.003	130.7	0.986	173.0	0.357	25.1
3.3	0.908	167.9	0.926	-111.6	0.004	127.5	0.977	171.6	0.334	23.6
3.4	0.923	167.8	0.817	-124.5	0.005	122.5	0.970	170.7	0.343	22.5
3.5	0.939	167.3	0.709	-135.4	0.005	122.6	0.964	170.2	0.384	21.8
3.6	0.950	166.4	0.614	-144.5	0.005	129.0	0.961	169.9	0.262	20.7
3.7	0.960	165.5	0.537	-152.2	0.006	134.5	0.959	169.8	0.049	19.4
3.8	0.966	164.4	0.474	-158.7	0.008	137.0	0.957	169.7	-0.128	18.0
3.9	0.970	163.4	0.425	-164.6	0.009	141.1	0.953	169.6	-0.220	16.7
4.0	0.971	162.4	0.386	-170.0	0.013	142.2	0.947	169.3	-0.310	14.9
4.1	0.972	161.5	0.354	-175.1	0.017	135.1	0.940	168.9	-0.366	13.1
4.2	0.973	160.7	0.326	179.6	0.022	123.0	0.935	168.4	-0.334	11.8
4.3	0.977	159.9	0.298	174.2	0.024	109.9	0.934	167.7	-0.251	10.9
4.4	0.980	158.9	0.274	168.7	0.025	100.5	0.936	166.8	-0.146	10.4
4.5	0.982	157.9	0.249	162.6	0.025	92.5	0.938	166.0	0.002	10.0

*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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