

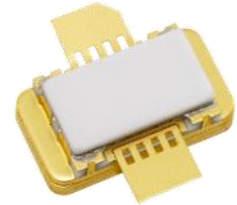
■ Features

- High Voltage Operation : $V_{DS}=50V$
- High Power : 50.8dBm (typ.) @ P_{sat}
- Proven Reliability

■ Description

Sumitomo Electric's GaN-HEMT offers high efficiency, ease of matching, greater consistency and broad bandwidth for high power amplifiers with 50V operation, and gives you higher gain.

This new product is ideally suited for use from 1.8GHz to 2.2GHz W-CDMA and LTE design requirements as it offers high gain, long term reliability and ease of use.


ABSOLUTE MAXIMUM RATINGS (Case Temperature $T_c=25\text{deg.C}$)

Item	Symbol	Condition	Rating	Unit
Operating Voltage	V_{DS}		55	V
Drain-Source Voltage	V_{DS}	$V_{GS}=-8V$	160	V
Gate-Source Voltage	V_{GS}		-15	V
Total Power Dissipation	P_t		97.8	W
Storage Temperature	T_{stg}		-65 to +175	deg.C
Channel Temperature	T_{ch}		250	deg.C

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	V_{DS}		≤ 55	V
Forward Gate Current	I_{GF}	$R_G=5\text{ ohm}$	≤ 95	mA
Reverse Gate Current	I_{GR}	$R_G=5\text{ ohm}$	≥ -3.5	mA
Channel Temperature	T_{ch}		≤ 200	deg.C
Average Output Power	$P_{ave.}$		≤ 47.5	dBm

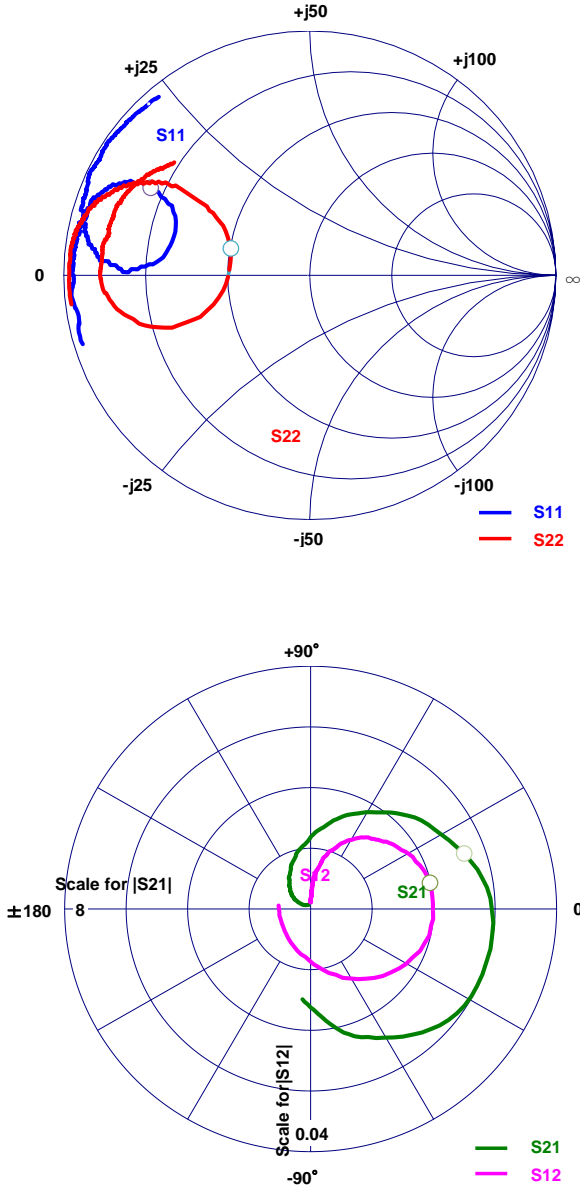
ELECTRICAL CHARACTERISTICS (Case Temperature $T_c=25\text{deg.C}$)

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	V_p	$V_{DS}=50V$ $I_{DS}=24\text{mA}$	-4.0	-	-2.0	V
Saturated Power	$P_{sat} *1$	$V_{DS}=50V$	50.0	50.8	-	dBm
Drain Efficiency	$\eta_D *2$	$I_{DS(DC)}=400\text{mA}$	27.0	31.0	-	%
Power Gain	$G_p *2$	$f=2.17\text{GHz}$	15.0	16.0	-	dB
Drain Efficiency at P_{sat}	$DE *1$	$I_{DS(DC)}=0\text{mA}$ $f=2.17\text{GHz}$	59.0	65.0	-	%
Thermal Resistance	R_{th}	Channel to Case at 52.5W P_{DC}	-	1.7	2.0	deg.C/W

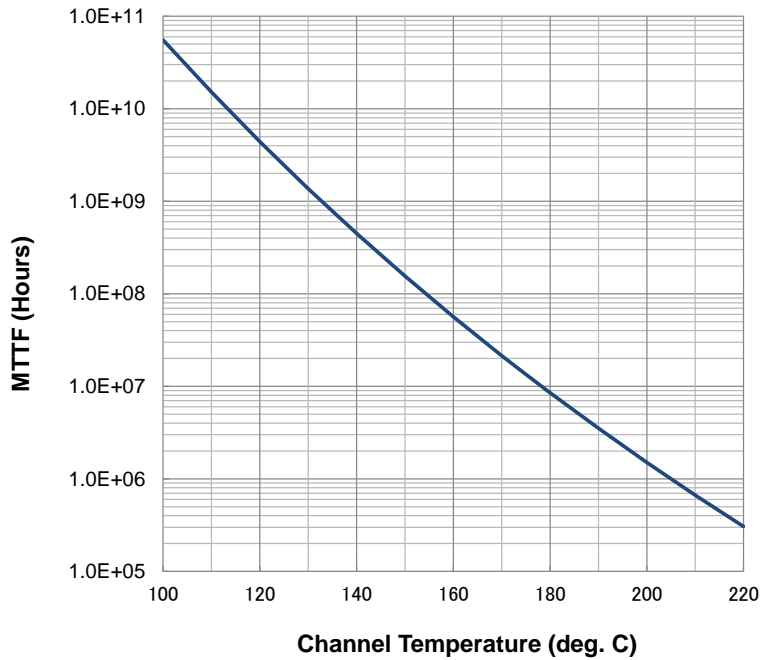
*1 : 10%-duty RF pulse (DC supply constant)

*2 : $P_{out}=43\text{dBm}$, CW modulation Signal (W-CDMA)

RoHS Compliance	YES
-----------------	-----

- Reference DATA -
S-Parameters @VDS=50V, IDS(DC)=400mA, f=0.5 to 4.5GHz
ZI = Zs = 50ohm Marker : 2.14GHz


Freq. GHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.97	-163.00	0.15	116.00	0.00	91.80	0.98	-173.00
0.60	0.96	-172.00	0.30	151.00	0.00	90.60	0.98	180.00
0.70	0.96	-179.00	0.44	151.00	0.00	87.00	0.98	173.00
0.80	0.97	178.00	0.56	149.00	0.00	86.50	0.97	171.00
0.90	0.97	176.00	0.67	146.00	0.00	86.40	0.97	170.00
1.00	0.96	175.00	0.78	142.00	0.00	85.90	0.96	168.00
1.10	0.97	174.00	0.90	138.00	0.01	84.10	0.95	166.00
1.20	0.97	173.00	1.03	133.00	0.01	84.20	0.94	164.00
1.30	0.97	171.00	1.17	126.00	0.01	81.70	0.92	162.00
1.40	0.95	169.00	1.34	120.00	0.01	79.00	0.90	160.00
1.50	0.95	168.00	1.58	113.00	0.01	77.20	0.88	157.00
1.60	0.95	166.00	1.86	105.00	0.01	73.90	0.85	155.00
1.70	0.95	164.00	2.18	93.70	0.01	68.70	0.80	152.00
1.80	0.94	161.00	2.67	82.80	0.01	62.30	0.74	149.00
1.90	0.91	158.00	3.37	67.60	0.02	51.30	0.65	146.00
2.00	0.86	154.00	4.23	48.10	0.02	36.90	0.52	146.00
2.10	0.74	151.00	5.32	20.10	0.02	12.50	0.34	161.00
2.20	0.58	160.00	5.98	-17.10	0.02	-25.70	0.48	-159.00
2.30	0.64	176.00	5.31	-51.20	0.01	-69.10	0.74	-166.00
2.40	0.76	179.00	4.10	-76.80	0.01	-120.00	0.84	-175.00
2.50	0.85	176.00	2.99	-95.10	0.01	174.00	0.85	178.00
2.60	0.89	173.00	2.24	-108.00	0.01	134.00	0.85	174.00
2.70	0.92	170.00	1.80	-118.00	0.01	116.00	0.85	172.00
2.80	0.93	168.00	1.44	-128.00	0.01	105.00	0.84	170.00
2.90	0.95	166.00	1.16	-136.00	0.01	95.60	0.84	169.00
3.00	0.96	164.00	0.96	-142.00	0.01	89.70	0.84	168.00
3.10	0.97	163.00	0.82	-148.00	0.02	85.00	0.84	167.00
3.20	0.97	161.00	0.70	-155.00	0.02	80.20	0.84	165.00
3.30	0.97	159.00	0.60	-161.00	0.02	76.40	0.84	164.00
3.40	0.98	157.00	0.53	-166.00	0.02	73.10	0.83	163.00
3.50	0.99	155.00	0.47	-171.00	0.02	69.90	0.84	162.00
3.60	0.98	153.00	0.43	-177.00	0.02	66.50	0.83	160.00
3.70	0.98	152.00	0.38	-178.00	0.03	62.80	0.83	159.00
3.80	0.98	149.00	0.35	-172.00	0.03	59.70	0.82	157.00
3.90	0.99	147.00	0.32	-167.00	0.03	56.30	0.81	155.00
4.00	0.98	144.00	0.30	-161.00	0.03	52.70	0.81	153.00
4.10	0.98	143.00	0.28	-155.00	0.04	48.70	0.79	151.00
4.20	0.97	140.00	0.26	-149.00	0.04	45.00	0.78	149.00
4.30	0.97	137.00	0.25	-142.00	0.05	40.30	0.77	146.00
4.40	0.96	134.00	0.24	-134.00	0.05	35.30	0.74	144.00
4.50	0.95	130.00	0.23	-126.00	0.06	29.90	0.72	140.00

**MTTF Calculation
- Estimated MTTF -**


Ea=1.6eV
Confidence Level=90%

Channel Temp (deg.C)	MTTF (Hours)
160	5.98 x 10 ⁷
180	9.02 x 10 ⁶
200	1.60 x 10 ⁶

$$AF = \exp\left[-\frac{Ea}{k}\left(\frac{1}{T_{stress}} - \frac{1}{T_{use}}\right)\right]$$

$$MTTF_{use} = MTTF_{stress} * AF$$

Where;

AF: acceleration factor

Ea: activation energy (1.6 eV)

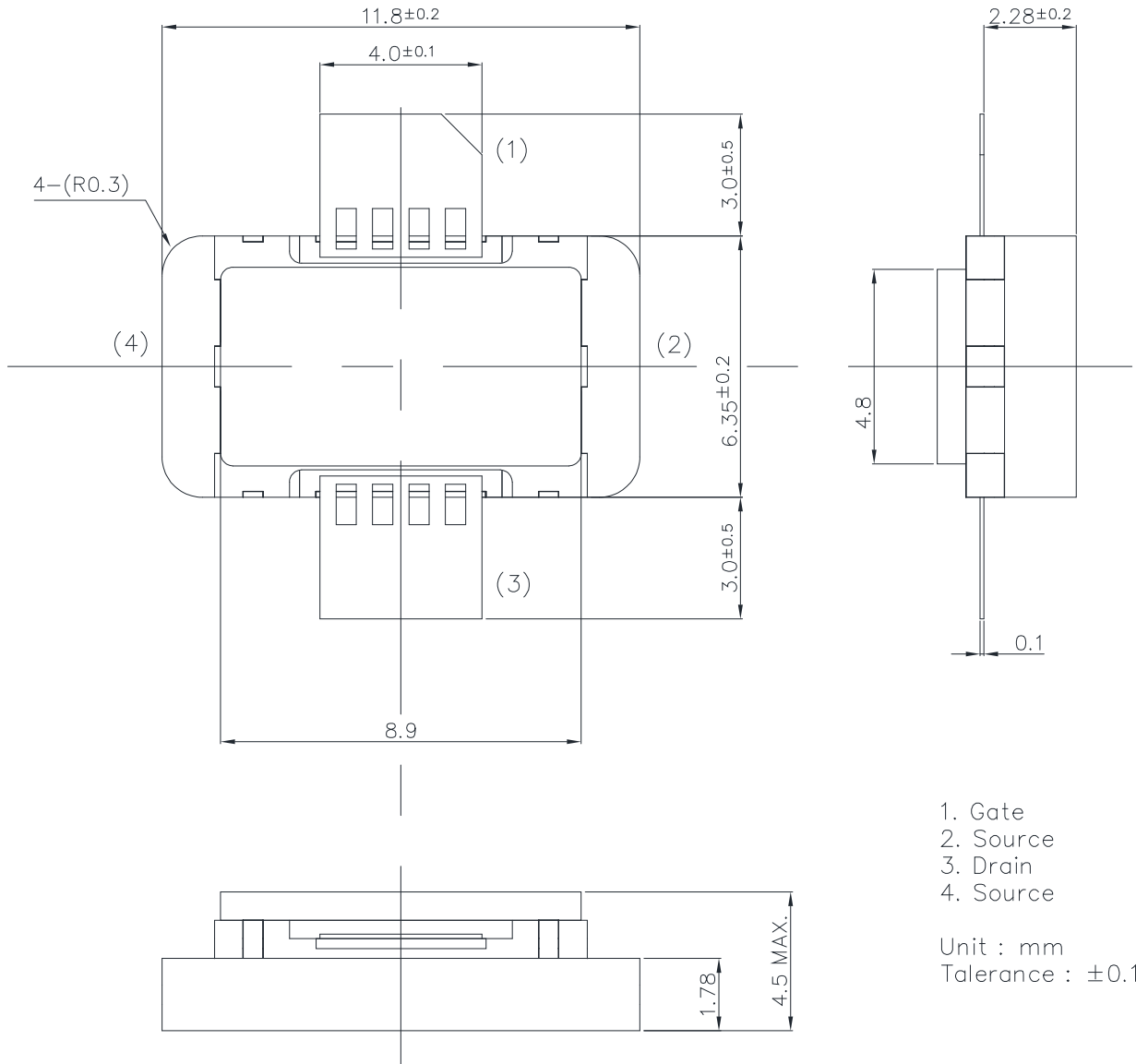
k: Boltzman's constant (8.62 x 10⁻⁵ eV/K)

T_{stress}: stress temperature (K)

T_{use}: use temperature (K)

ESD characteristic

Test Methodology	Class
Human Body Model (per JESD22-A114)	1A
Machine Model (per JEIA/ESD22-A115)	A
Device Charged Model (per JESD22-C101)	IV

M1H Package Outline
Metal-Ceramic Hermetic Package


For Safety, Observe the Following Procedures Environmental Management

- 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.

Any information, such as descriptions of a function and examples of application circuits, in this document are presented solely as a reference for the purpose to show examples of operations and uses of Sumitomo Electric semiconductor device(s); Sumitomo Electric does not warrant the proper operation of the device(s) with respect to its use based on such information. When the user develops equipment incorporating the device(s) based on such information, they must assume full responsibility arising out of using such information. Sumitomo Electric assumes no liability for any damages whatsoever arising out of the use of the information.

Any information in this document, including descriptions of function and schematic diagrams, shall not be construed as a license for the use or exercise of any intellectual property right, such as patent right or copyright, or any other right of Sumitomo Electric or any third party nor does Sumitomo Electric warrant non-infringement of any third-party's intellectual property right or other right by using such information. Sumitomo Electric assumes no liability for any infringement of the intellectual property rights or other rights of third parties which would result from the use of information contained herein.

The products described in this document are designed, developed and manufactured as contemplated for general use, including, without limitation, ordinary industrial use, general office use, personal use, and household use, but are not designed, developed and manufactured as contemplated (1) for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could have a serious effect to the public, and could lead directly to death, personal injury, severe physical damage or other loss (i.e., nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system), or (2) for use requiring extremely high reliability (i.e., submersible repeater and artificial satellite). Please note that Sumitomo Electric will not be liable to the user and/or any third party for any claims or damages arising from the aforementioned uses of the products.

Any semiconductor devices have an inherent chance of failure. You must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of excessive current levels and other abnormal operating conditions.

If any products described in this document represent goods or technologies subject to certain restrictions on export under the Foreign Exchange and Foreign Trade Law of Japan, the prior authorization of the Japanese government will be required for export of those products from Japan.

<http://www.sedi.co.jp/>

ATTENTION

Information in this document is subject to change without notice.