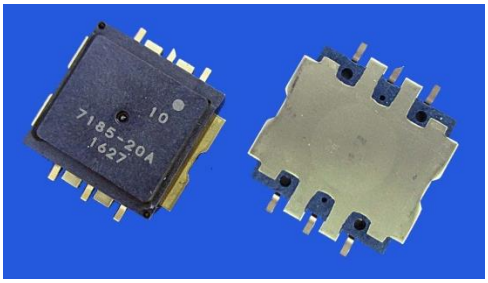
■ Features

- High Output Power: P5dB=43.0dBm (Typ.)
- High Gain: GL=11.0 to 12.0dB (Typ.)
- High Power Added Efficiency: PAE=39% (Typ.)
- Broad Band: Frequency=7.1 to 8.5GHz
- Internally Matched
- Plastic Package for SMT applications



■ Description

The SGK7185-20A is a high power GaN-HEMT that is internally matched for standard communication bands to provide optimum power and linearity.

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

Item	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	26	V
Gate-Source Voltage	V_{GS}	-10	V
Total Power Dissipation	P_T	48	W
Storage Temperature	T_{stg}	-40 to +125	deg.C
Channel Temperature	T_{ch}	250	deg.C
Input Power	Pin	39	dBm

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
Drain-Source Voltage	V_{DS}		<=24	V
Forward Gate Current	I_{GF}	Rg=100ohm	<=4.0	mA
Reverse Gate Current	I_{GR}	Rg=100ohm	>=-1.9	mA
Channel Temperature	T_{ch}		<+192	deg.C

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

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Saturated Drain Current	I_{DSS}	Vds=10V, Vgs=0V	-	3.9	-	A
Trans Conductance	g_m	Vds=24V, Ids=0.8A	-	1.8	-	S
Pinch-off Voltage	V_P	Vds=24V, Ids=0.8mA	-	-3	-	V
Frequency Range	f	VDS=24V-typ. IDS(DC)=1.0A-typ. Vgs-constant *1:f=7.1 to 7.8 GHz *2:f=7.8 to 8.5 GHz	7.10	-	8.50	GHz
Output Power at 5dB G.C.P.	P_{5dB}		41.5	43.0	-	dBm
Linear Gain at Pin=21dBm	GL		10.0*1	12.0*1	-	dB
			10.0*2	11.0*2	-	dB
Drain Current at 5dB G.C.P.	I_{DSR}		-	1.7	2.6	A
Power Added Efficiency at 3dB G.C.P.	PAE		-	39	-	%
3rd Order Inter Modulation Distortion	IM_3	f=7.1GHz, 8.5GHz Δ f=10MHz, 2-tone Test Pout=27.5dBm (S.C.L.)	-40.0	-43.0	-	dBc
Thermal Resistance	R_{th}	Channel to Case (Tc=25deg.C, Pdiss=24W)	-	2.7	3.4	deg.C/W
Channel Temperature Rise	ΔT_{ch}	(V_{DS} x I_{DSR} – Pout + Pin) x R_{th}	-	70	150	deg.C

G.C.P. : Gain Compression Point, S.C.L. : Single Carrier Level

CASE STYLE	I2C	
RoHS Compliance	YES	
ESD	Class 1C	1000V to <2000V
MSL	2	One year after opening the packing

Note : Based on ANSI/ESDA/JEDEC JS-001-2012(C=100pF, R=1.5kohm)

Ordering Information

Model Type	MOQ	MOU	Packing Style
SGK7185-20A	15pcs	15pcs	50pcs-max./Tray , 1Tray-max./Packing
SGK7185-20AT	500pcs	500pcs	24mm width Tape (500pcs/Reel)

* MOQ stands for Minimum Order Quantity.
* MOU stands for Minimum Order Unit size.

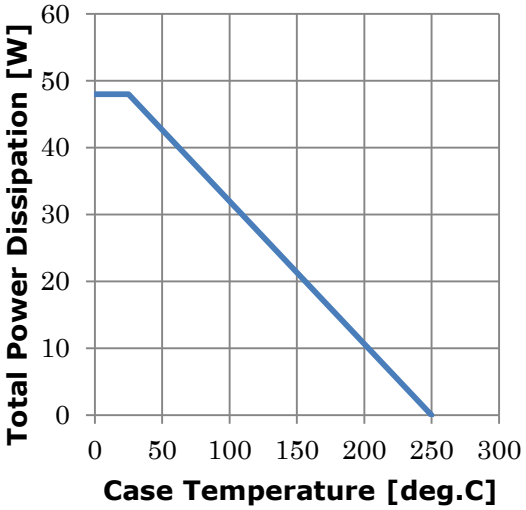
Note

・This device will not be delivered with test data but tested pass/fail 100% against DC and RF specifications.

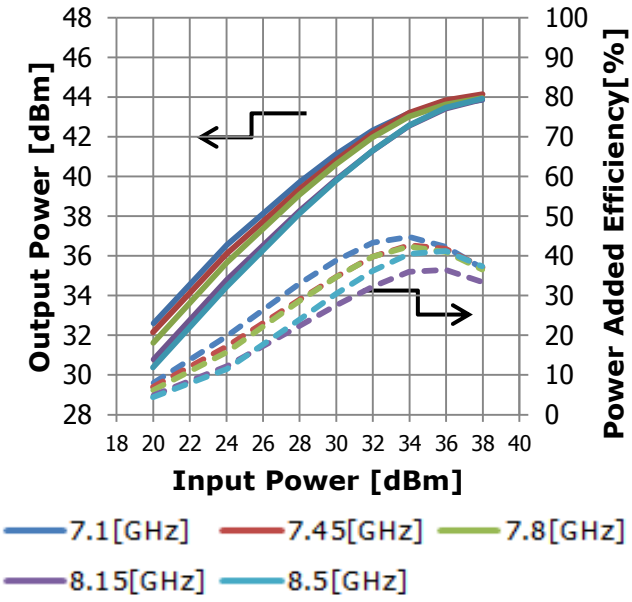
・NO liquid cleaning process is suitable for this device. (including de-ionized water or solvent)

● RF Characteristics

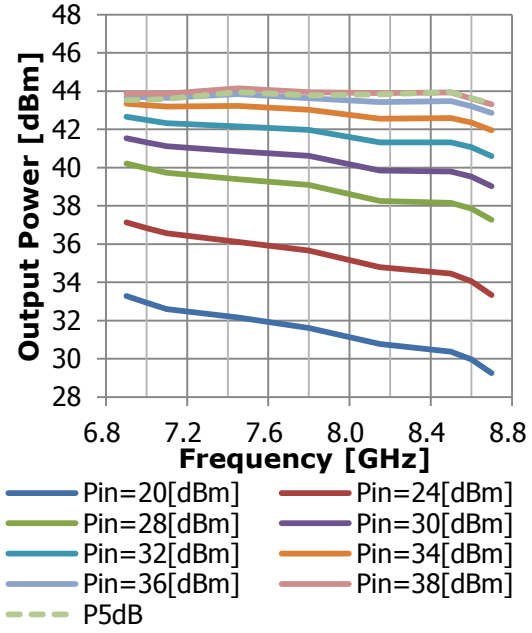
Power Derating Curve



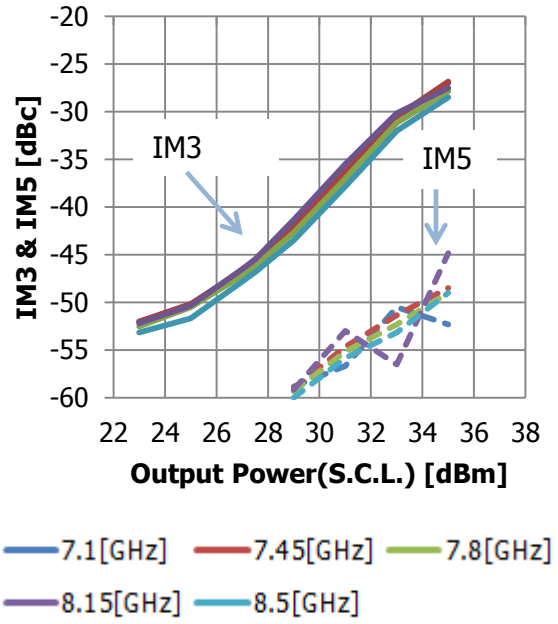
Input Power vs. Output Power and Power Added Efficiency
V_{DS}=24V, $I_{DS(DC)}$=1000mA



Output Power vs. Frequency
V_{DS}=24V, $I_{DS(DC)}$=1000mA

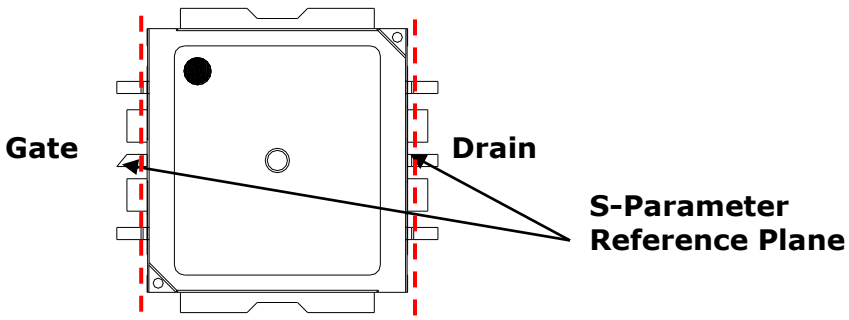


IMD vs. Output Power
V_{DS}=24V, $I_{DS(DC)}$=1000mA

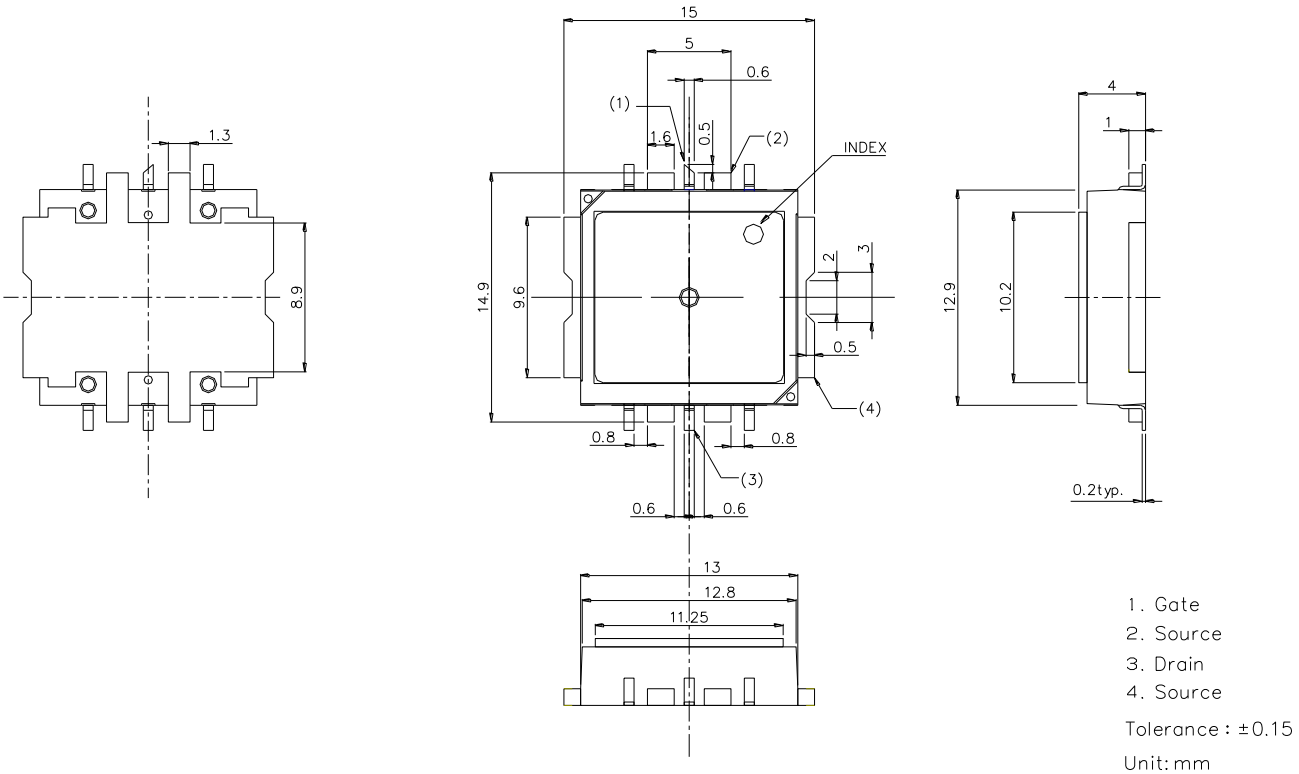


● S-Parameter

Freq.	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
6900MHz	0.428	-9.2	4.070	-120.2	0.089	176.4	0.260	145.5
7000MHz	0.329	-16.4	4.202	-134.7	0.093	162.0	0.331	126.2
7100MHz	0.228	-19.8	4.231	-150.0	0.095	147.3	0.384	108.3
7200MHz	0.141	-13.1	4.201	-164.5	0.096	132.8	0.416	93.2
7300MHz	0.084	15.5	4.188	-178.7	0.097	119.6	0.449	80.4
7400MHz	0.105	62.0	4.176	166.1	0.097	104.3	0.475	64.8
7500MHz	0.168	72.8	4.034	151.0	0.095	89.9	0.460	50.2
7600MHz	0.223	72.0	3.894	137.1	0.093	76.2	0.441	36.8
7700MHz	0.270	68.2	3.768	123.2	0.090	62.7	0.404	24.9
7800MHz	0.313	62.8	3.645	109.4	0.089	49.1	0.371	14.4
7900MHz	0.343	56.6	3.553	96.1	0.087	35.8	0.334	5.3
8000MHz	0.366	48.7	3.474	82.1	0.087	21.7	0.307	-3.2
8100MHz	0.367	40.8	3.437	68.5	0.087	7.9	0.286	-10.4
8200MHz	0.354	33.2	3.404	53.7	0.087	-7.2	0.274	-18.4
8300MHz	0.324	26.0	3.361	37.9	0.089	-22.5	0.266	-25.8
8400MHz	0.272	20.7	3.289	21.5	0.091	-39.9	0.274	-33.9
8500MHz	0.202	19.3	3.201	4.1	0.093	-59.1	0.294	-42.9
8600MHz	0.123	39.4	3.097	-14.0	0.096	-80.0	0.341	-55.5
8700MHz	0.160	90.6	2.954	-33.6	0.095	-103.8	0.406	-73.0



- **Package Out line**
  Case Style : I2C

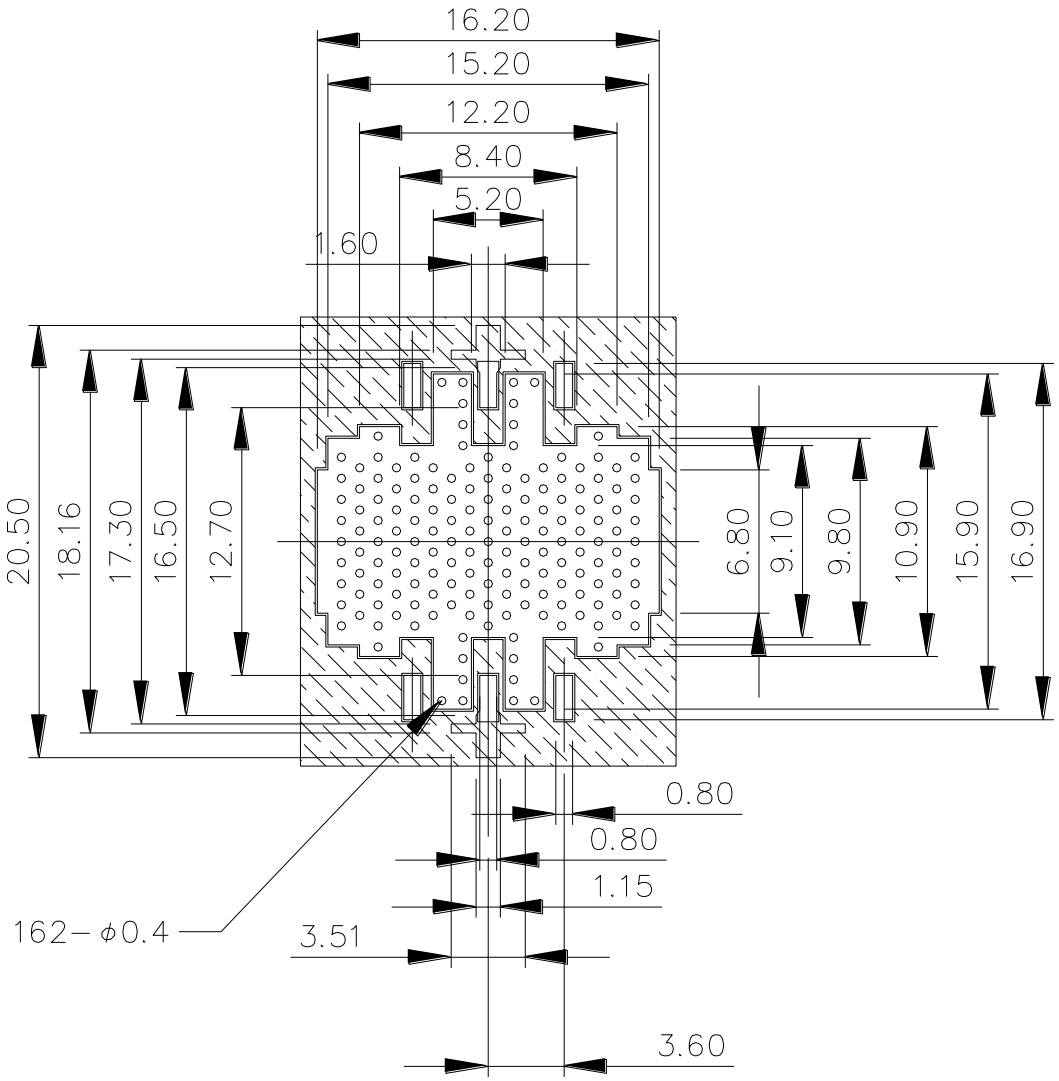


1. Gate
2. Source
3. Drain
4. Source

Tolerance : ±0.15

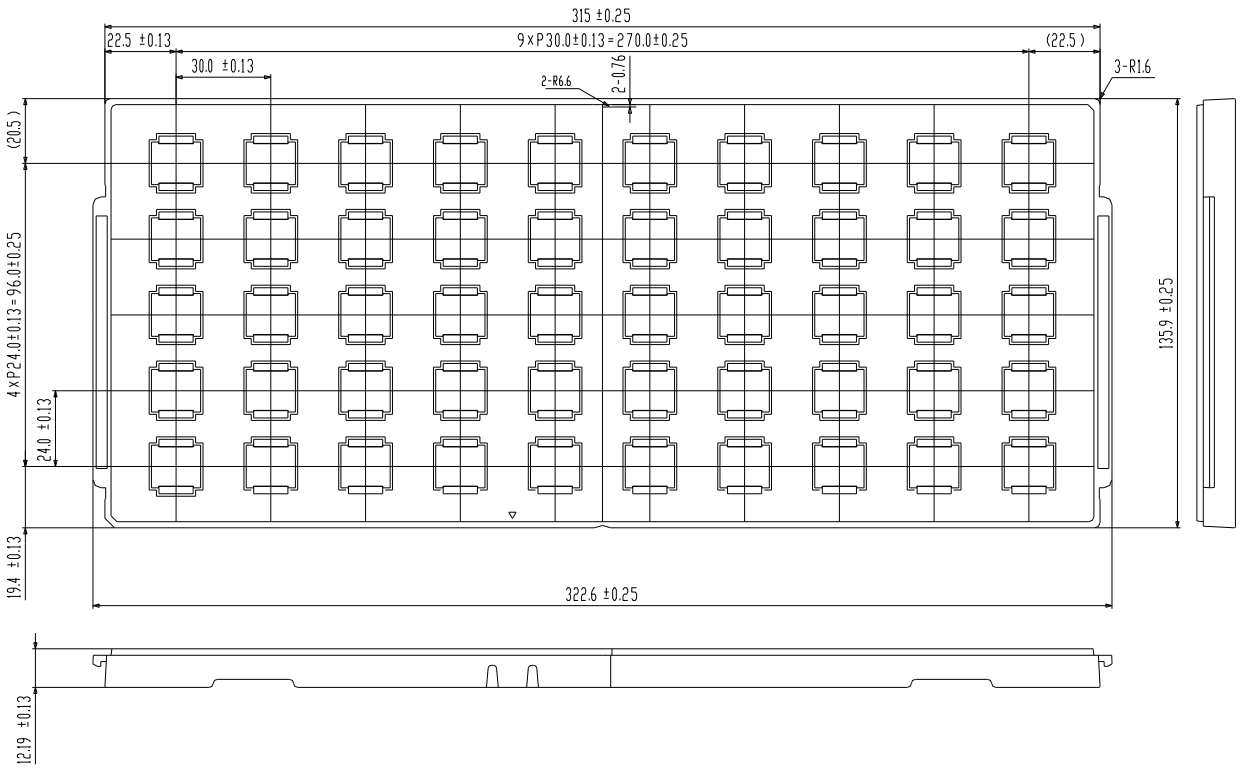
Unit: mm

- **PCB Pads and Solder-Resist Pattern**

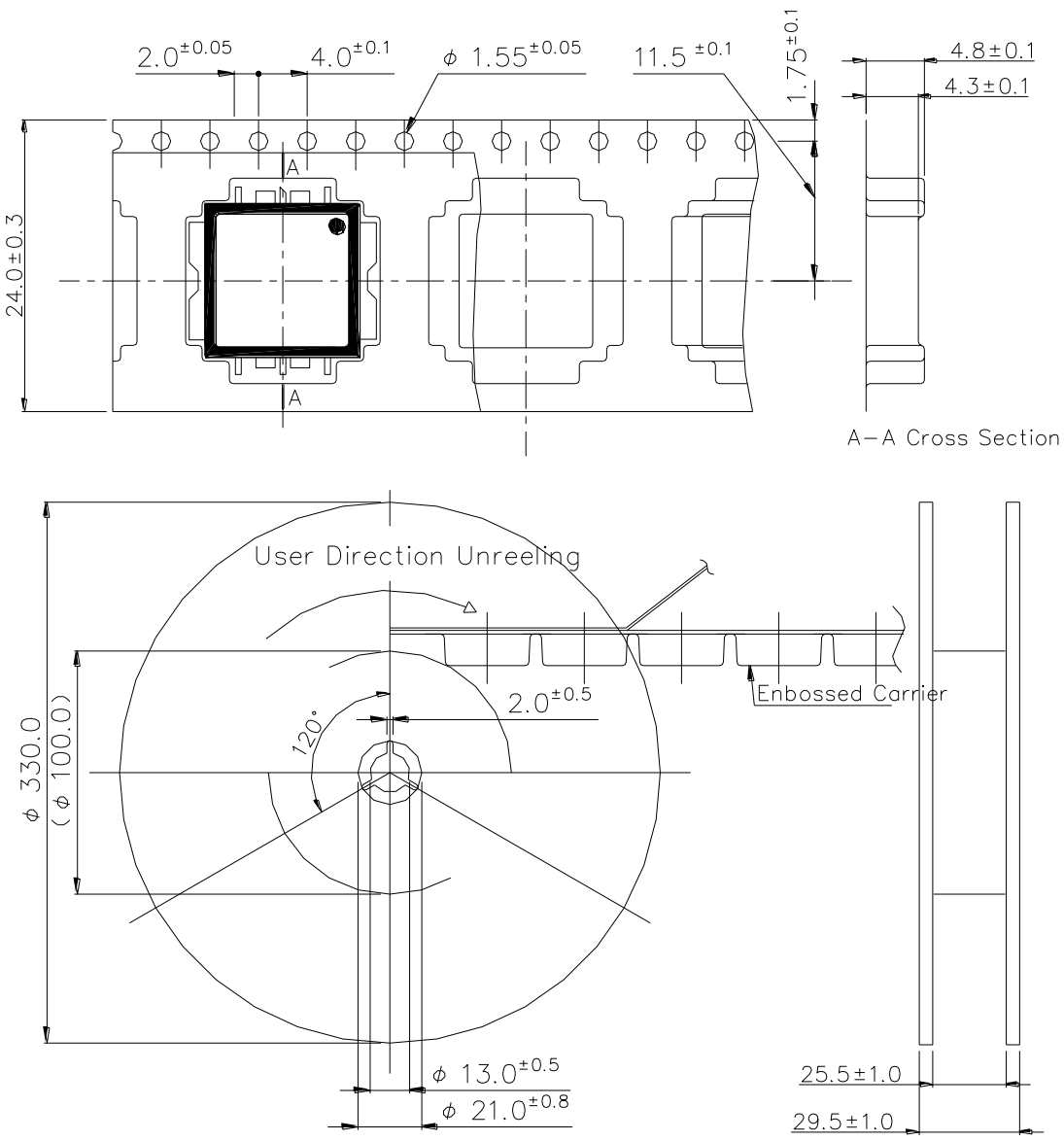


Notes :
1. Laminate : Rogers Corporation RO4003, Thickness t=0.508mm, Cu Foil 18um.
   Finish to copper foil : Ni 0.1um min. / Au 0.1um (Both side).
2. ▨ : Resist

- **JEDEC Tray Dimension (Part No:SGK7185-20A)**



- **Tape/Reel Configuration**
  (Part No:SGK7185-20AT)



Quantity: 500pcs/tape
Tape Material: Conductive PS

(unit in mm)

•Mounting Method of SMD(Surface Mount Devices) for Lead-free Solder

Mounting Condition

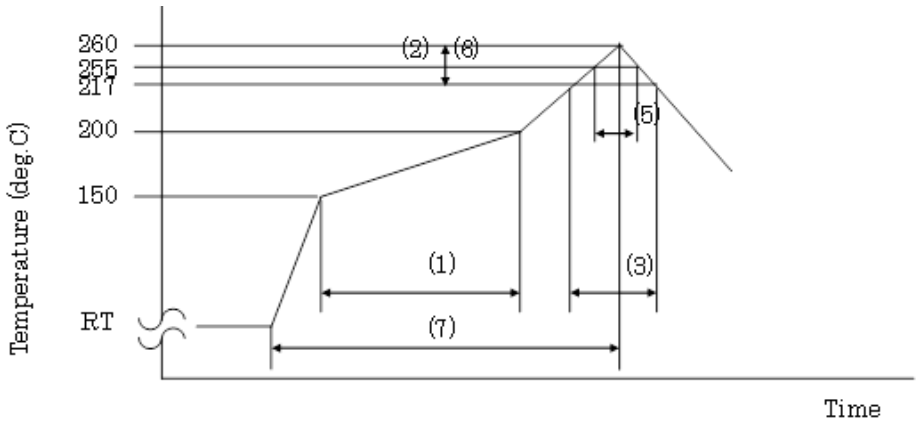
(1)For soldering, Lead-free solder (Sn-3.0Ag-0.5Cu)*1 or equivalent shall be used.
(*1: The figure displays with weight %. A predominantly tin-rich alloy with 3.0% silver and 0.5% copper.)

(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.

● Humidity Lifetime and fit rate for SGKxxxx-20A

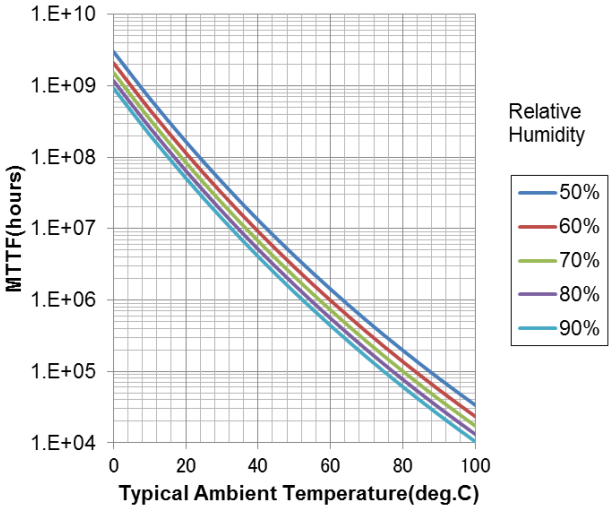
The following graph shows the lifetime of moisture resistance for the SGKxxxx-20A.
Each graph indicates the MTTF and Fit rate which calculated from the results of highly accelerated temperature and humidity stress test (HAST).

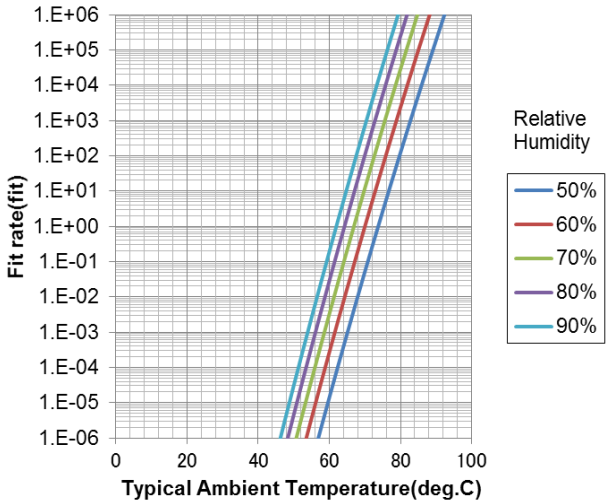
Representative of device type : SGK5872-20A
Subject of device type : SGK5872-20A, SGK7185-20A

Field environmental conditions for operation

In case of that SGKxxxx-20A is mounted to non-hermetic package, please refer the following recommendations and notes for design with, and assembly and use of our products.

Note 1. When drain current cuts off, it should be cut off by drain bias, and not cut off by gate bias only.The humidity lifetime becomes shorter in case of the gate-only cut off operation due to electric field strength interacting with humidity.
Note 2. SGKxxxx-20A should be used under the environment conditions of no dew condensation. These plots do not apply in the case of liquid absorbed into the resin, whether applied to the part in assembly or as condensate in the application.





Condition: VDS=24V, IDS=200mA

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.

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