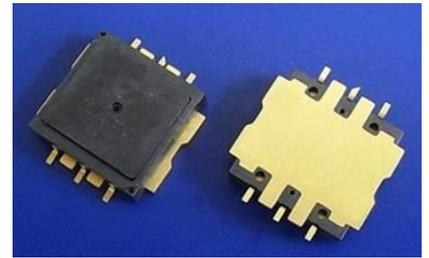


FEATURES

- High Output Power: P5dB=43.0dBm (Typ.)
- High Gain: GL=12.0 to 13.0dB (Typ.)
- High Power Added Efficiency: PAE=41% (Typ.)
- Broad Band: 5.85 to 7.2GHz
- Internally Matched
- Plastic Package for SMT applications

DESCRIPTION

The SGK5872-20A 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 Tc=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	P _{in}	38	dBm

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
Drain-Source Voltage	V _{DS}		≤24	V
Forward Gate Current	I _{GF}	R _g =100ohm	≤4.0	mA
Reverse Gate Current	I _{GR}	R _g =100ohm	≥-1.9	mA
Channel Temperature	T _{ch}		<+192	deg.C

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

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Saturated Drain Current	I _{DSS}	V _{DS} =10V, V _{GS} =0V		3.9		A
Trans Conductance	G _m	V _{DS} =24V, I _{DS} =0.8A	-	1.8	-	S
Pinch-off Voltage	V _P	V _{DS} =10V, I _{DS} =0.8mA	-	-3	-	V
Frequency Range	f		5.85	-	7.2	
Output Power at 5dB G.C.P.	P _{5dB}	V _{ds} =24V-typ. I _{ds} (DC)=1.0A-typ.	41.5	43.0	-	dBm
Linear Gain at Pin=20dBm	GL	V _{gs} -constant *1:f=5.85 to 6.53 GHz *2:f=6.53 to 7.2 GHz	11.0 ^{*1}	13.0 ^{*1}	-	dB
			11.0 ^{*2}	12.0 ^{*2}		dB
Drain Current at 5dB G.C.P.	I _{DSR}		-	1.6	2.4	A
Power Added Efficiency at 3dB G.C.P.	PAE		-	41	-	%
3 rd Order Inter modulation Distortion	IM ₃	f=5.85GHz, 7.2GHz Δf=10MHz, 2-tone Test P _{out} =27.5dBm (S.C.L.)	-40.0	-43.0	-	dBc
Thermal Resistance	R _{th}	Channel to Case (T _c =25deg.C, P _{diss} =24W)	-	2.7	3.4	deg.C/W
Channel Temperature Rise	ΔT _{ch}	(V _{DS} × I _{DSR} - P _{out} + P _{in}) × R _{th}	-	61	150	deg.C

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



SGK5872-20A
C-Band Internally Matched GaN-HEMT

CASE STYLE	I2C	
RoHS Compliance	YES	
ESD	Class 1C	1000V to <2000V
MSL	2A	4 weeks after open the package

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

Model Type	MOQ	MOU	Packing Style
SGK5872-20A	15pcs	15pcs	15pcs/Tray
SGK5872-20AT	500pcs	500pcs	24mm width Tape (500pcs/Reel)

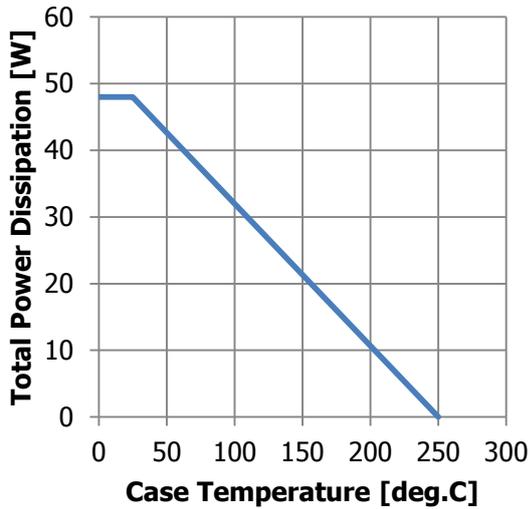
- * MOQ stands for Minimum Order Quantity.
- * MOU stands for Minimum Order Unit size.

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 required for this device. (including de-ionized water or solvent)

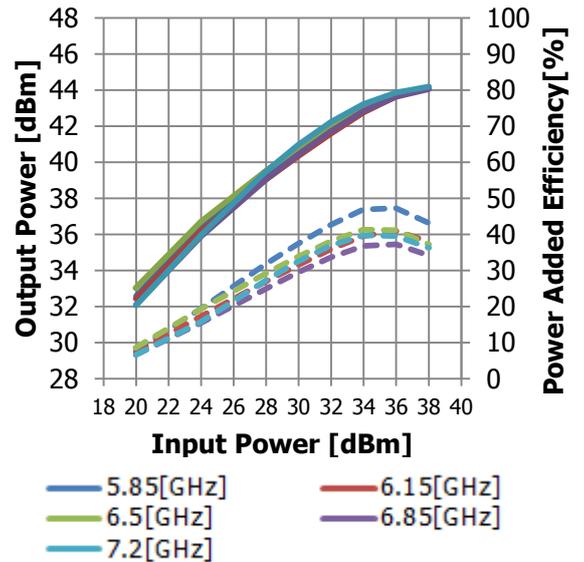
● RF Characteristics

Power Derating Curve



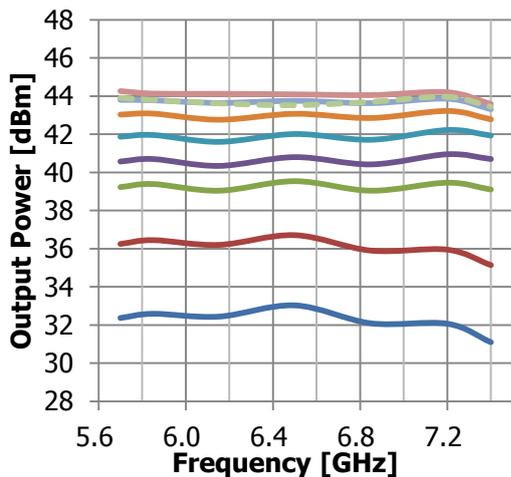
Input Power vs. Output Power and Power Added Efficiency

$V_{DS}=24V, I_{DS(DC)}=1000mA$



Output Power vs. Frequency

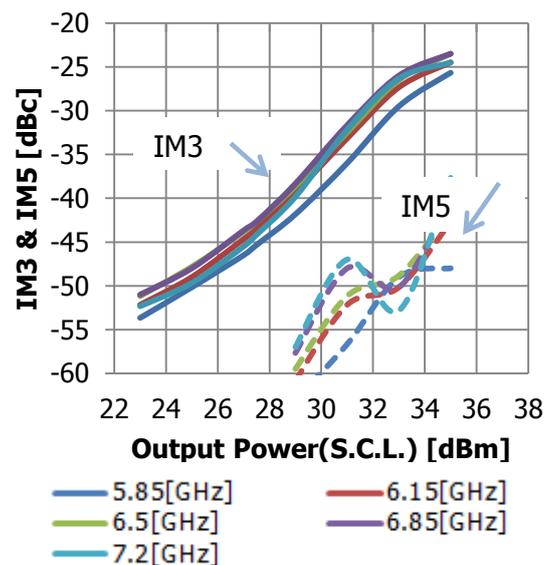
$V_{DS}=24V, I_{DS(DC)}=1000mA$



- 20[dBm]
- 24[dBm]
- 28[dBm]
- 30[dBm]
- 32[dBm]
- 34[dBm]
- 36[dBm]
- 38[dBm]
- P5dB

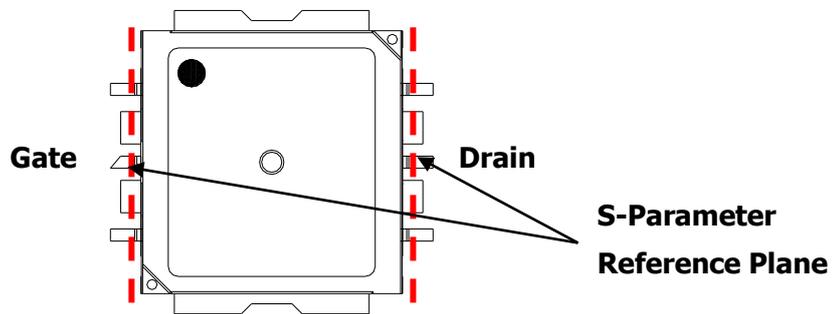
IMD vs. Output Power

$V_{DS}=24V, I_{DS(DC)}=1000mA$



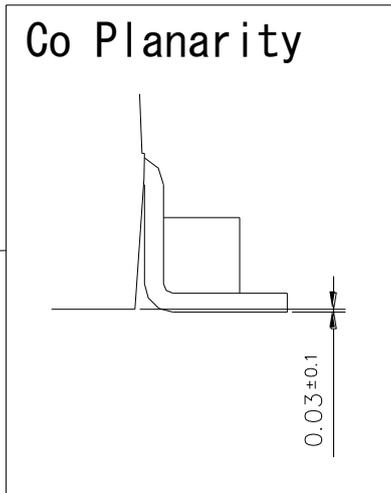
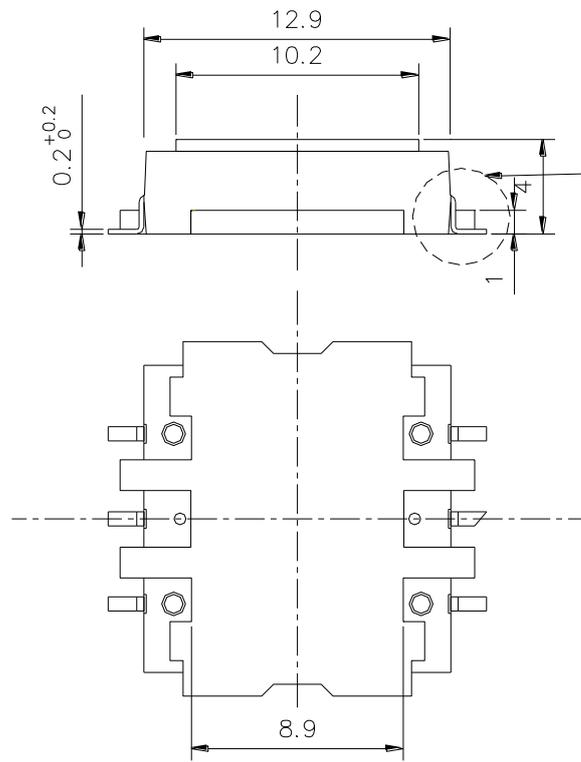
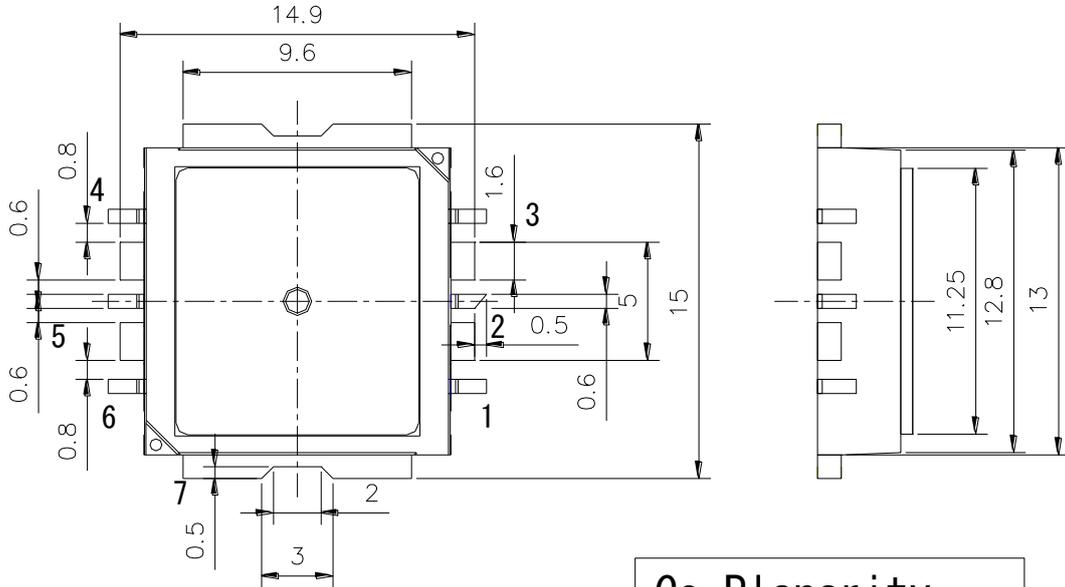
● S-Parameter

Freq.	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
5600MHz	0.609	66.1	4.206	-35	0.071	-97.7	0.22	-115.2
5700MHz	0.592	60.1	4.195	-46.7	0.073	-109	0.243	-133.5
5850MHz	0.547	52.2	4.19	-64.8	0.076	-126.3	0.294	-162.7
6000MHz	0.499	48.3	4.21	-82.4	0.082	-143	0.375	171.6
6100MHz	0.497	43.5	4.342	-95.3	0.087	-157.8	0.412	153.9
6200MHz	0.453	37.7	4.363	-109.5	0.087	-172.1	0.455	139.5
6300MHz	0.401	34.5	4.363	-123.2	0.088	174.5	0.493	125.7
6400MHz	0.352	33.8	4.332	-137	0.09	160.8	0.519	111.3
6500MHz	0.309	36.3	4.311	-150.6	0.091	147	0.539	96.8
6600MHz	0.274	41	4.338	-165	0.091	133.3	0.547	82.3
6700MHz	0.252	49.9	4.323	-179.8	0.092	119.1	0.535	66.4
6800MHz	0.255	61.8	4.294	165	0.093	104.1	0.498	49.1
6900MHz	0.294	71.6	4.247	149.2	0.093	88.7	0.445	29.9
7000MHz	0.365	75.9	4.152	132.5	0.092	72.6	0.378	7.3
7100MHz	0.452	74.4	3.993	115.3	0.089	55.7	0.302	-21.1
7200MHz	0.536	68.9	3.736	97.9	0.084	39.1	0.246	-59.7
7300MHz	0.611	62.1	3.414	81.3	0.077	22.7	0.239	-104.6
7400MHz	0.671	54.2	3.073	65.5	0.07	7.6	0.277	-142.7



● **Package Out line**

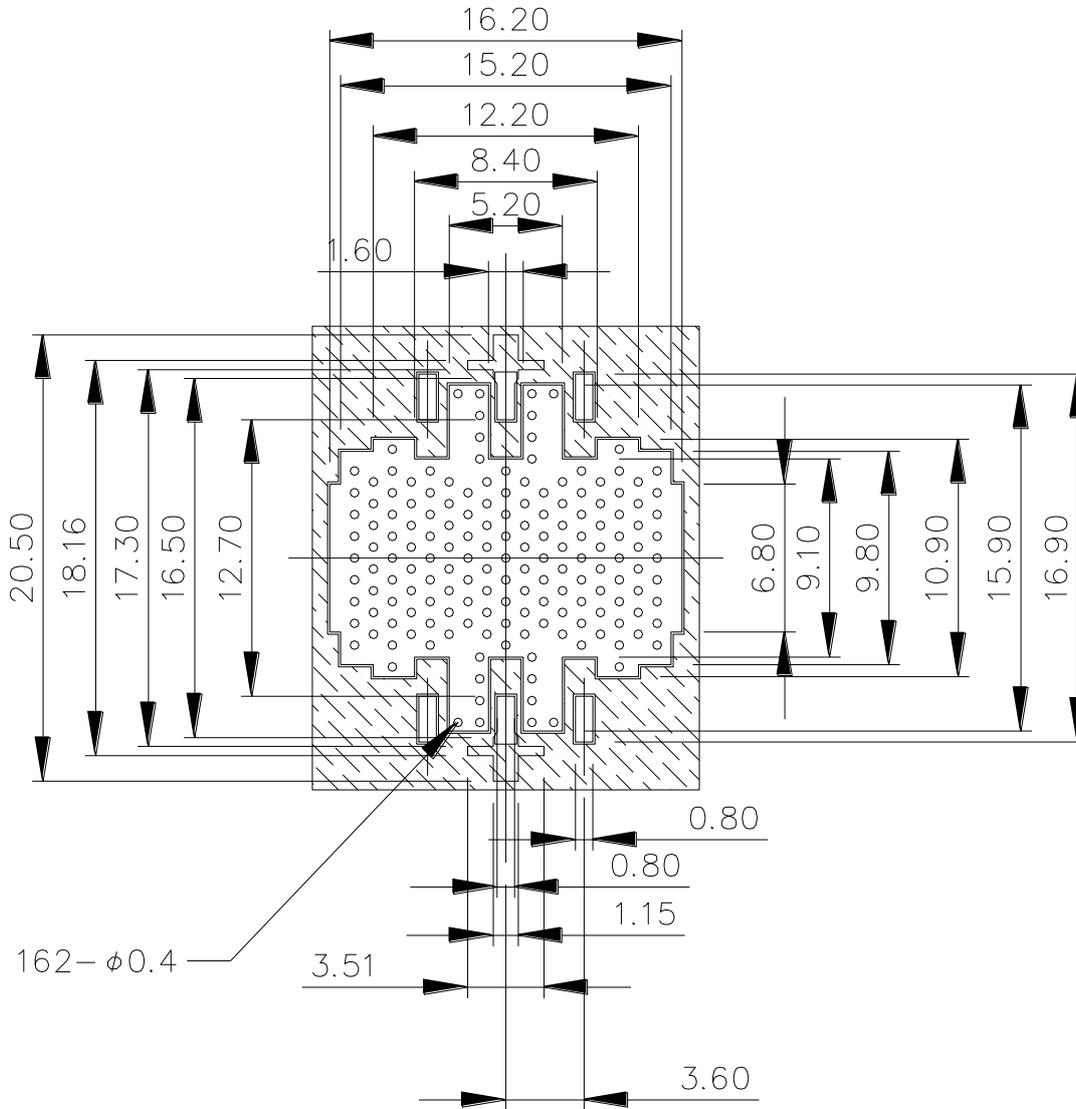
Case Style : I2C



Pin Assignments

- 1 : NC
- 2 : Gate
- 3 : NC
- 4 : NC
- 5 : Drain
- 6 : NC
- 7 : Source

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



Notes :

1. Laminate : Rogers Corporation R04003, Thickness $t=0.508\text{mm}$, Cu Foil $18\mu\text{m}$.
 Finish to copper foil : Ni $0.1\mu\text{m}$ min. / Au $0.1\mu\text{m}$ (Both side).
2. : Resist

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

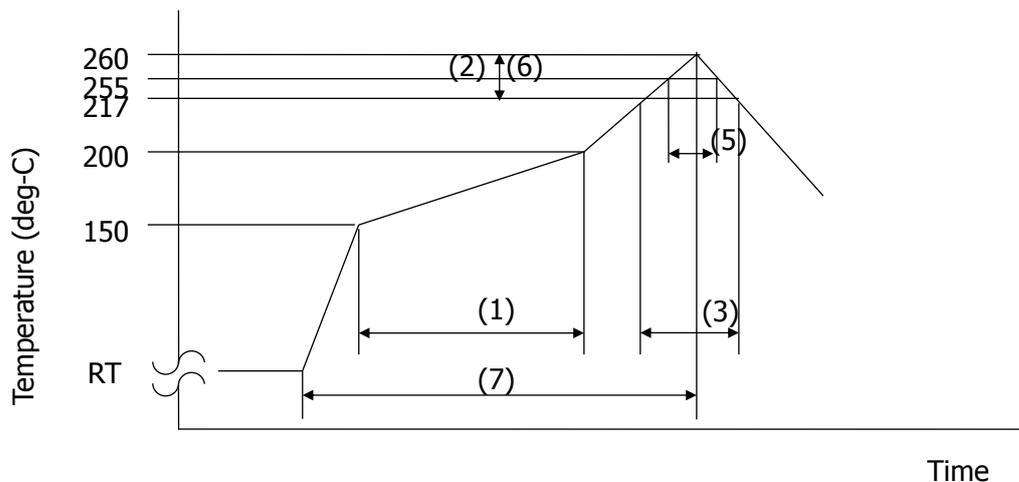
Mounting Condition

- (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

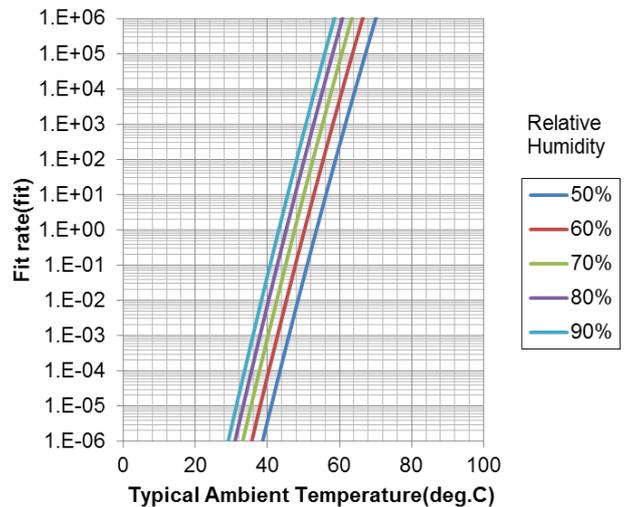
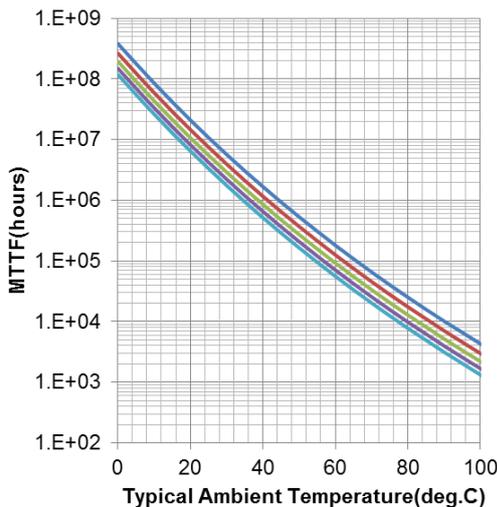
Field environmental conditions for operation

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