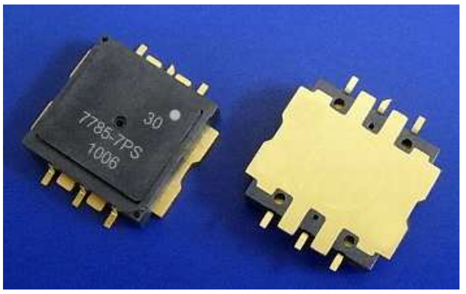
ELM7785-7PS

C-Band Internally Matched FET

● FEATURES

High Output Power: P1dB=39.0dBm (Typ.)
High Gain: G1dB=9.5dB (Typ.)
High PAE: η_{add}=33% (Typ.)
Broad Band: 7.7~8.5GHz
Internally matched
Plastic Package for SMT applications



● DESCRIPTION

The ELM7785-7PS is a power GaAs FET that is internally matched for standard communication bands to provide optimum power and gain.

ABSOLUTE MAXIMUM RATING (Case Temperature Tc=25 deg-C)

Item	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	15	V
Gate-Source Voltage	V_{GS}	-5	V
Total Power Dissipation	P_T	42.8	W
Storage Temperature	T_{STG}	-40 to +125	deg-C
Channel Temperature	T_{CH}	175	deg-C

RECOMMENDED OPERATING CONDITION (Case Temperature Tc=25 deg-C)

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	V_{DS}		<10	V
Forward Gate Current	I_{GF}	R_G=100 ohm	<+16	mA
Reverse Gate Current	I_{GR}	R_G=100 ohm	>-2.2	mA
Channel Temperature	T_{CH}		155	deg-C

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

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Drain Current	I_{DSS}	V_{DS}=5V, V_{GS}=0V	-	3400	5200	mA
Trans conductance	gm	V_{DS}=5V, I_{DS}=2200mA	-	3400	-	mS
Pinch-off Voltage	V_P	V_{DS}=5V, I_{DS}=170mA	-0.5	-1.5	-3.0	V
Gage-Source Breakdown Voltage	V_{GSO}	I_{GS}=170uA	-5.0	-	-	V
Output Power at 1dB G.C.P.	P_{1dB}	V_{DS}=10V $I_{DS(DC)}$=2200mA(typ.) f=7.7~8.5 GHz	38.0	39.0	-	dBm
Power Gain at 1dB G.C.P.	G_{1dB}		8.0	9.5	-	dB
Drain Current	I_{dsr}		-	2200	2600	mA
Power Added Efficiency	η_{add}		-	33	-	%
Gain Flatness	ΔG		-	-	1.2	dB
3rd Order Inter Modulation Distortion	IM_3	f=8.5GHz Δf=10MHz, 2-tone Test Pout=28.0dBm (S.C.L)	-40	-43	-	dBc
R_{th}	R_{th}	Channel to Case	-	2.5	3.0	Deg-C/W
ΔT_{ch}	ΔT_{ch}	10V x I_{dsr} x R_{th}	-	-	80	Deg-C

CASE STYLE: I2C

ESD	**Class 3 A**	**4000-8000V**
MSL	**2A**	**4 weeks after open the package**

Ordering Information

Model Type	**MOQ**	**MOU**	**Packing Style**
ELM7785-7PS	15pcs	15pcs	15pcs Tray
ELM7785-7PST	500pcs	500pcs	24mm width Tape (500pcs/Reel)

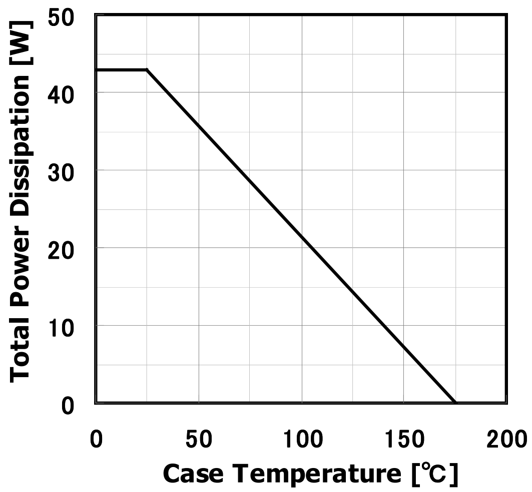
*MOQ stands for Minimum Order Quantity.
*MOU stands for Minimum Order Unit size.

Note

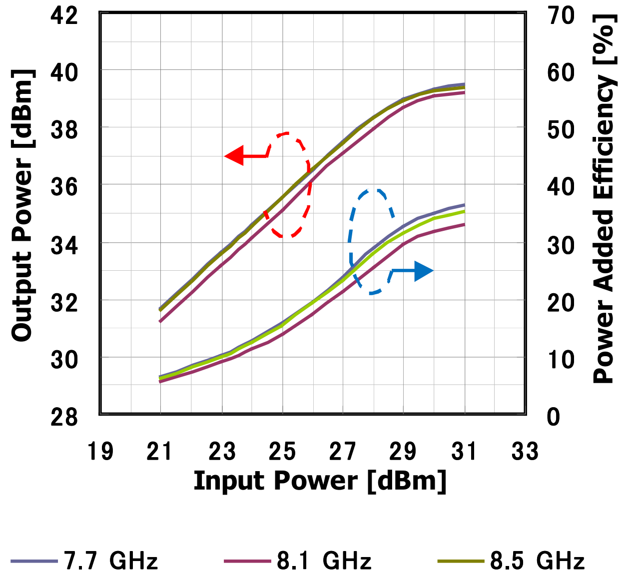
- This device will not be delivered with test data but tested pass/fail 100% against DC and RF specifications.
- NO liquid cleaning process is suitable for this device. (including de-ionized water or solvent)

- **RF Characteristics**

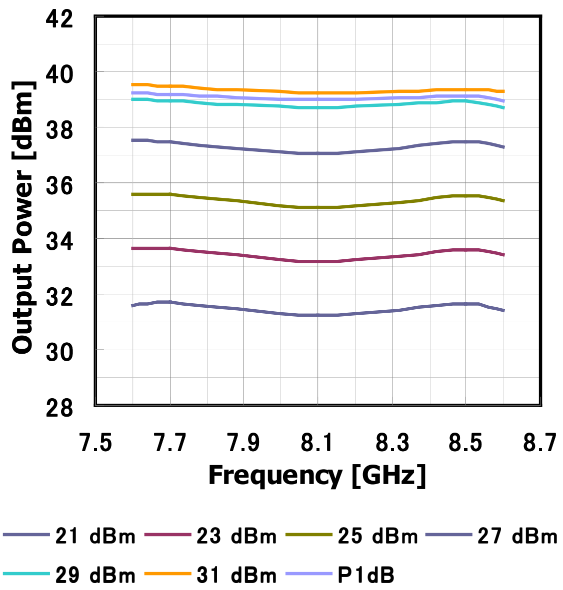
Power Derating Curve



Input Power vs. Output Power, Power Added Efficiency
V_{DS}=10V, $I_{DS(DC)}$=2200mA

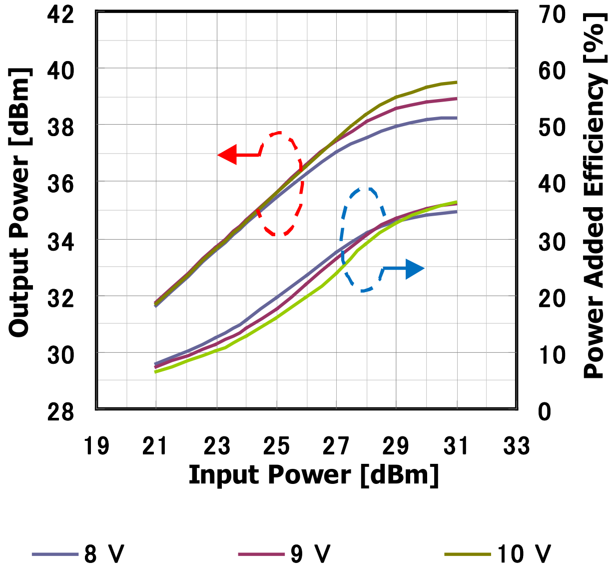


Output Power vs. Frequency
V_{DS}=10V, $I_{DS(DC)}$=2200mA

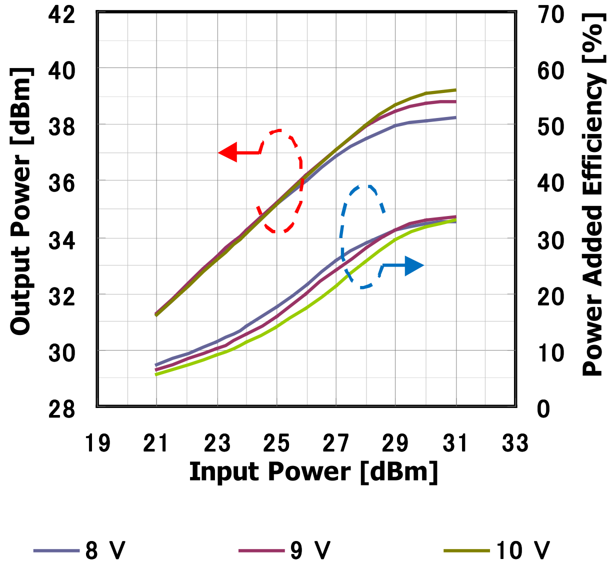


IMD vs. Output Power
V_{DS}=10V, $I_{DS(DC)}$ =2200mA

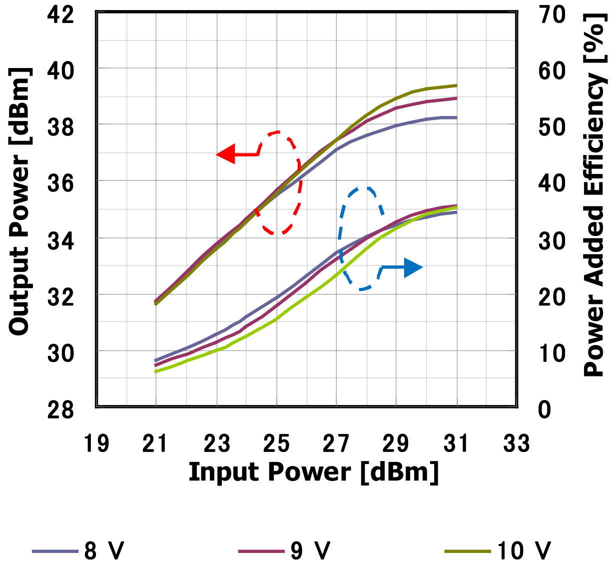
Input Power vs. Output Power, Power Added Efficiency by Drain Voltage
$I_{DS(DC)}$=2200mA @7.7GHz



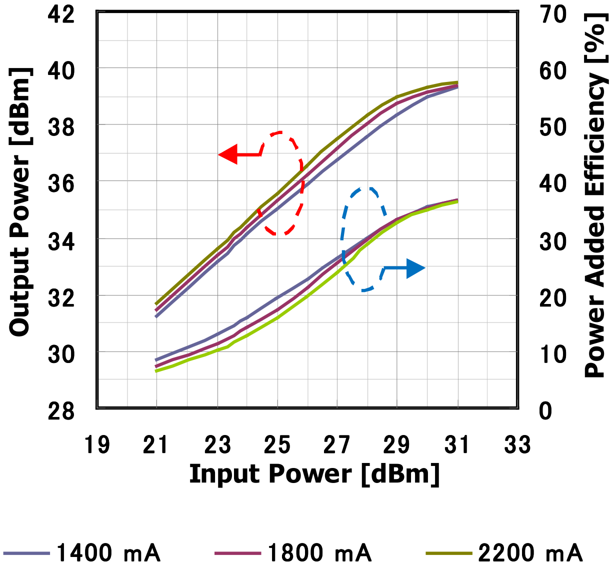
Input Power vs. Output Power, Power Added Efficiency by Drain Voltage
$I_{DS(DC)}$=2200mA @8.1GHz



Input Power vs. Output Power, Power Added Efficiency by Drain Voltage
$I_{DS(DC)}$=2200mA @8.5GHz



Input Power vs. Output Power, Power Added Efficiency by Quiescent Drain Current V_{DS}=10V @7.7GHz



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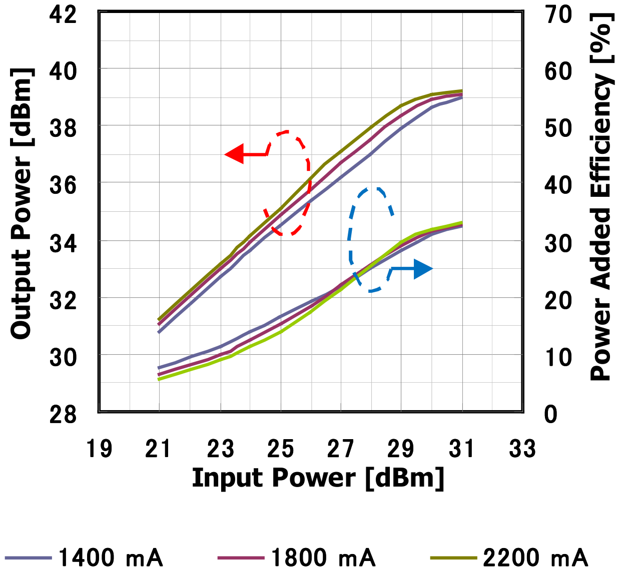
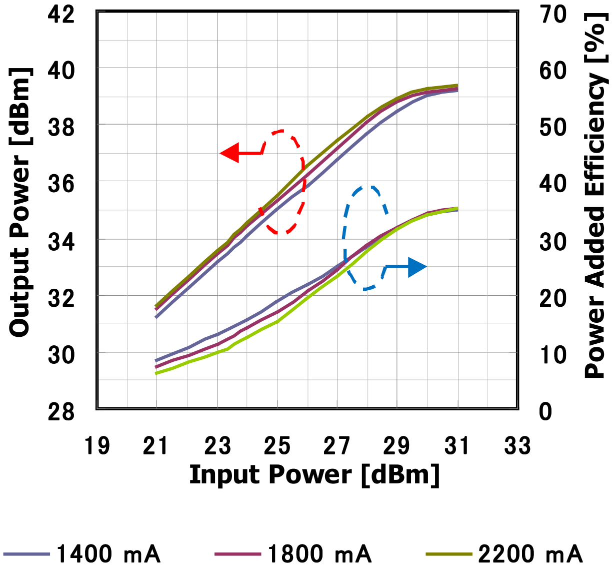
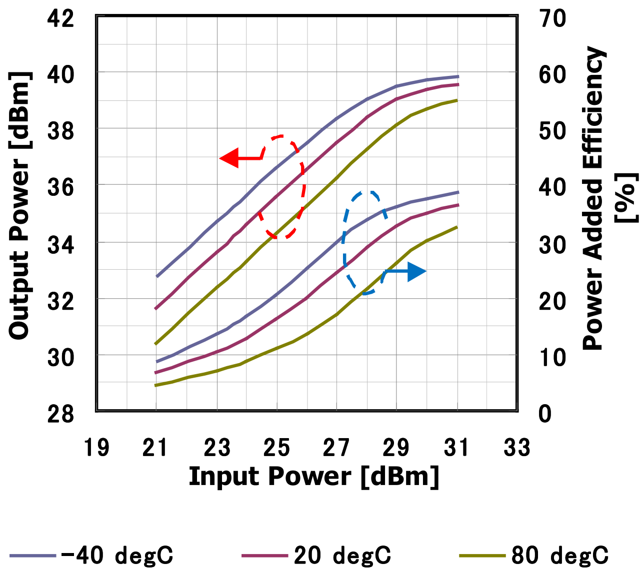


Input Power vs. Output Power, Power Added Efficiency by Quiescent Drain Current V_{DS}=10V @8.5GHz



Input Power vs. Output Power, Power Added Efficiency by Temperature
V_{DS}=10V $I_{DS(DC)}$=2200mA @7.7GHz



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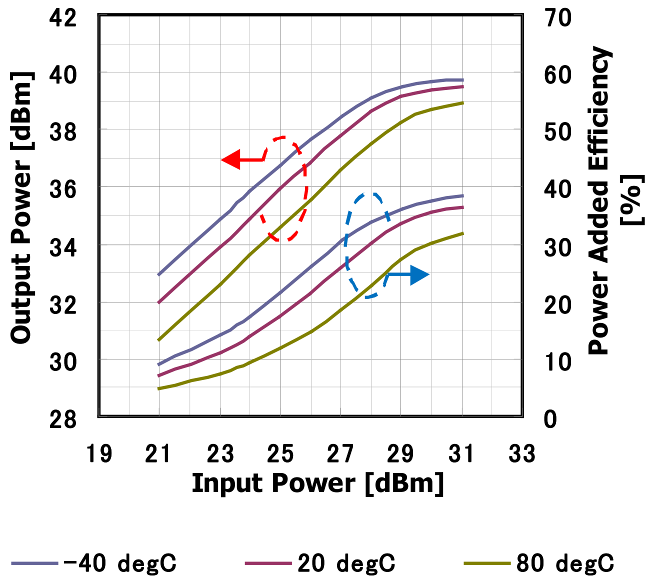
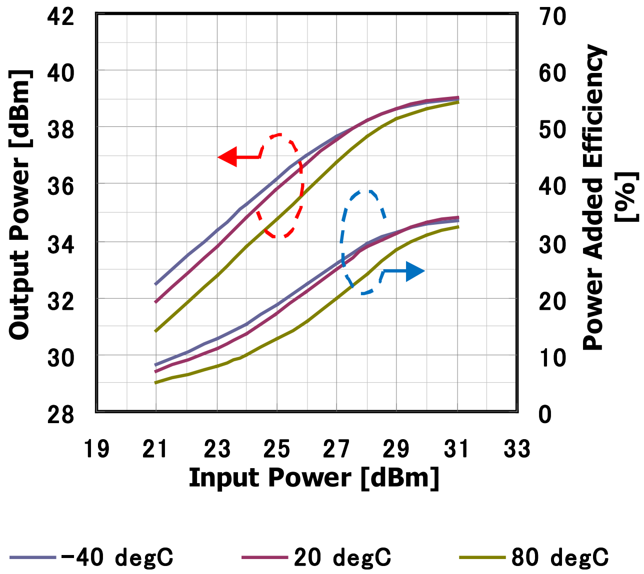
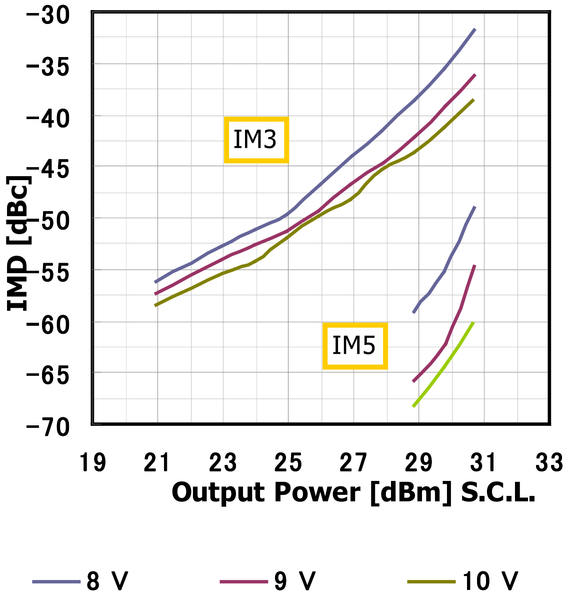
V_{DS}=10V $I_{DS(DC)}$=2200mA @8.1GHz



Input Power vs. Output Power, Power Added Efficiency by Temperature
V_{DS}=10V $I_{DS(DC)}$=2200mA @8.5GHz



IMD Performance vs. Output Power by Drain Voltage
$I_{DS(DC)}$=2200mA @7.7GHz



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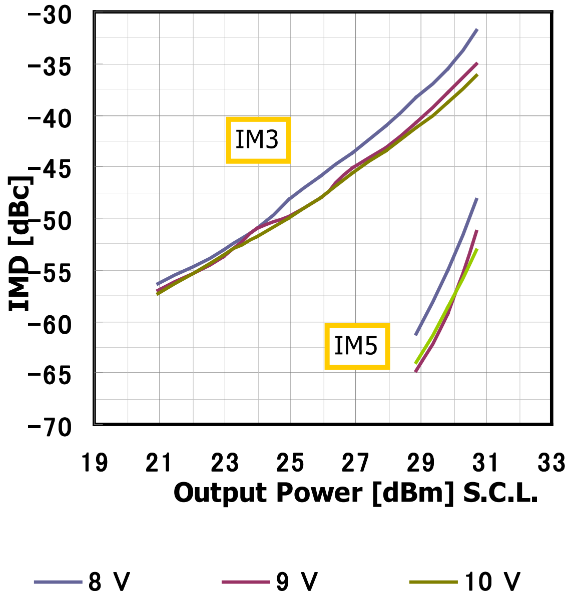

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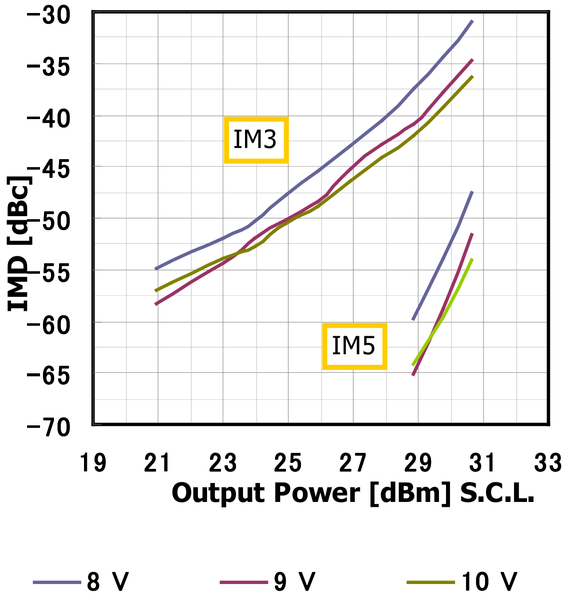
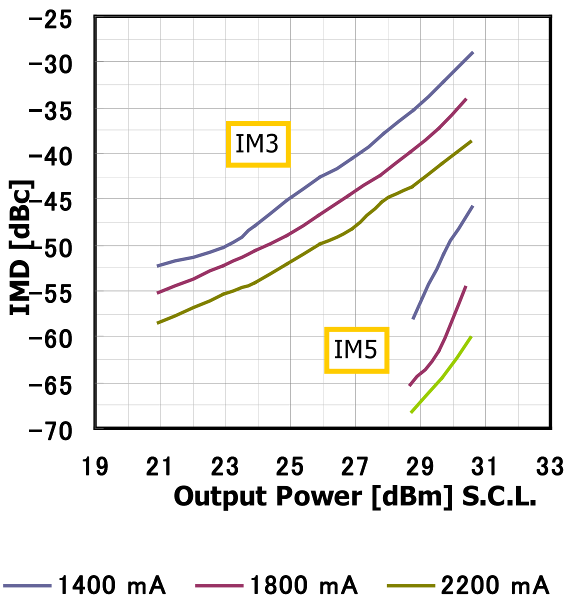
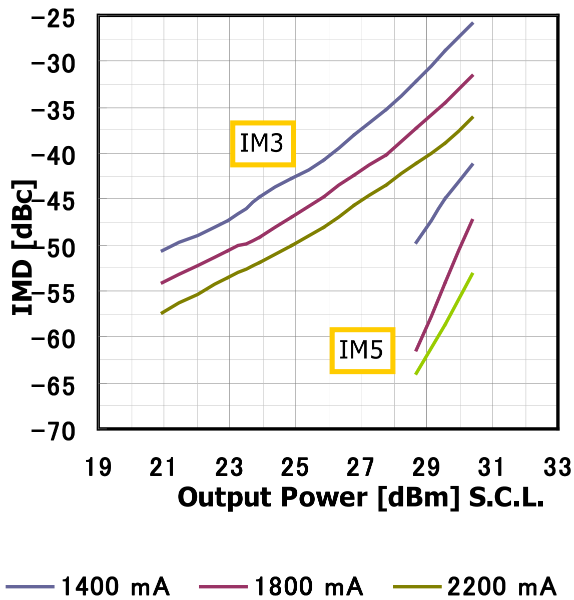


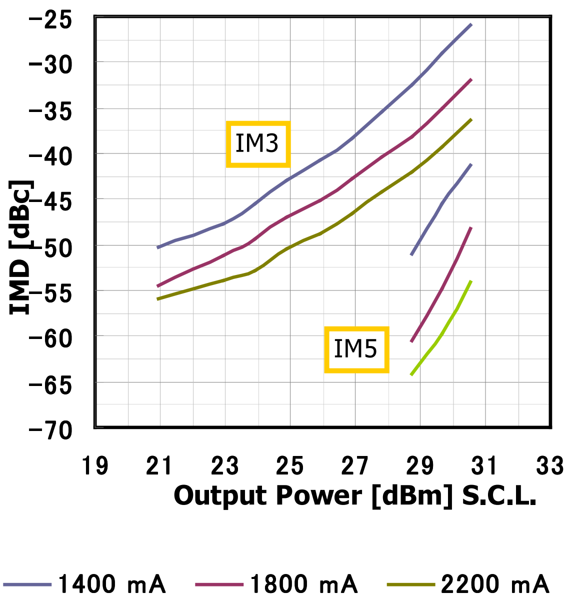
IMD Performance vs. Output Power by Quiescent Drain Current
V_{DS}=10V @7.7GHz



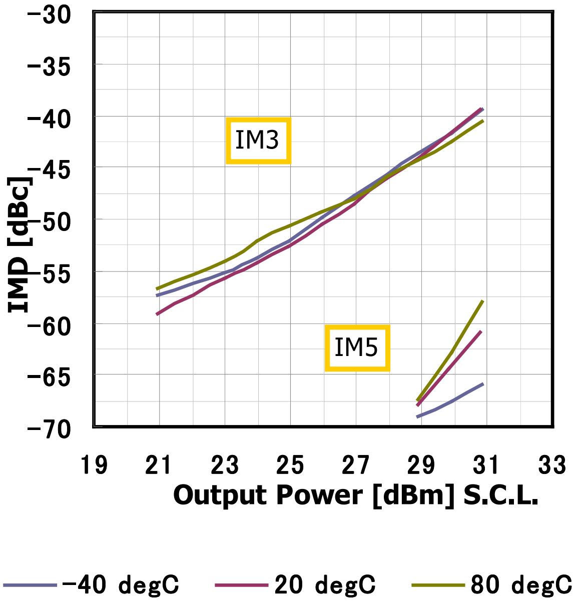
IMD Performance vs. Output Power by Quiescent Drain Current
V_{DS}=10V @8.1GHz



IMD Performance vs. Output Power by Quiescent Drain Current
V_{DS}=10V @8.5GHz



IMD Performance vs. Output Power by Temperature
V_{DS}=10V $I_{DS(DC)}$=2200mA @7.7GHz



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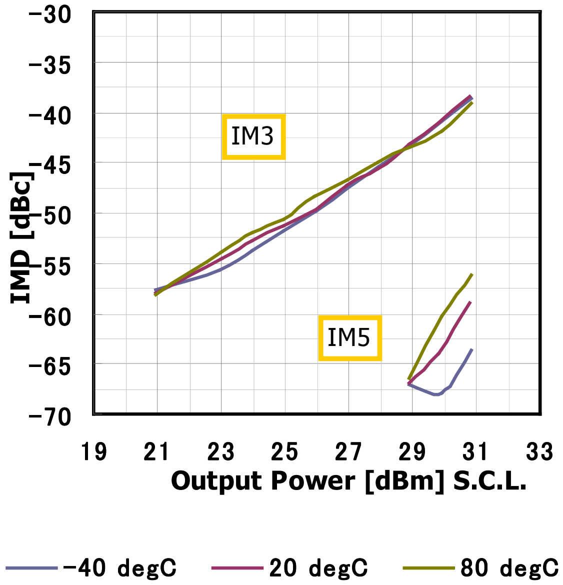

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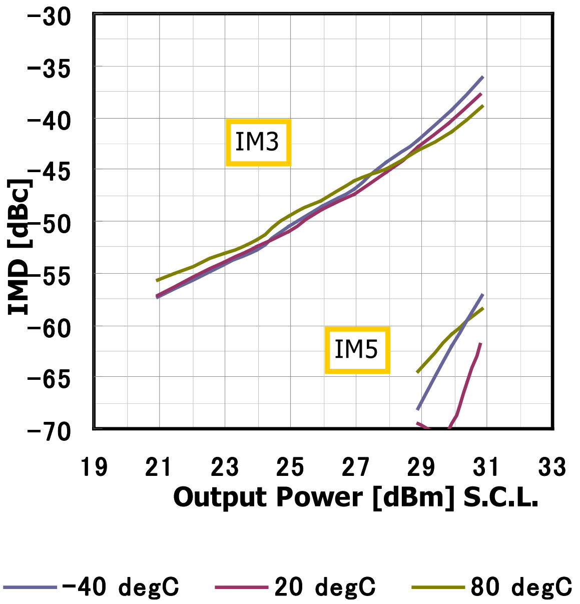
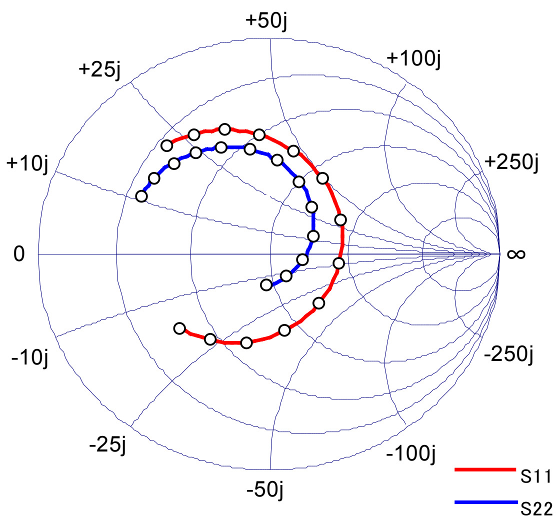
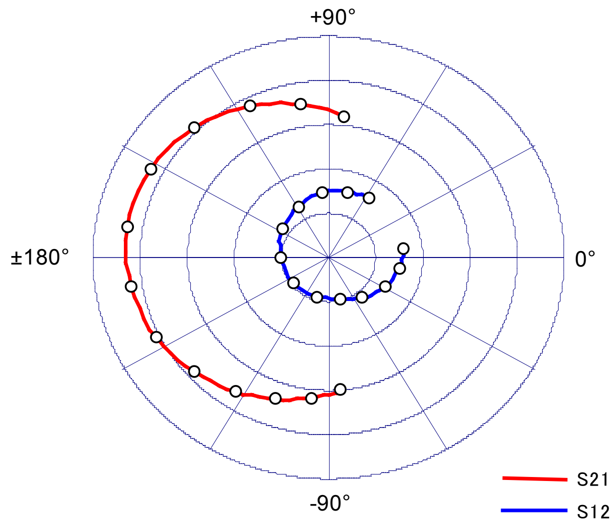
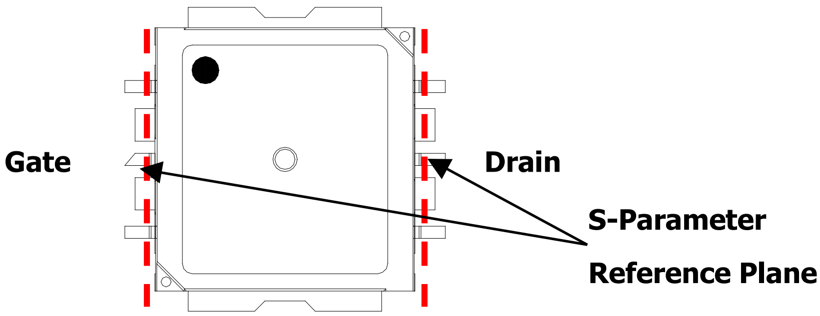


- **S-Parameter**

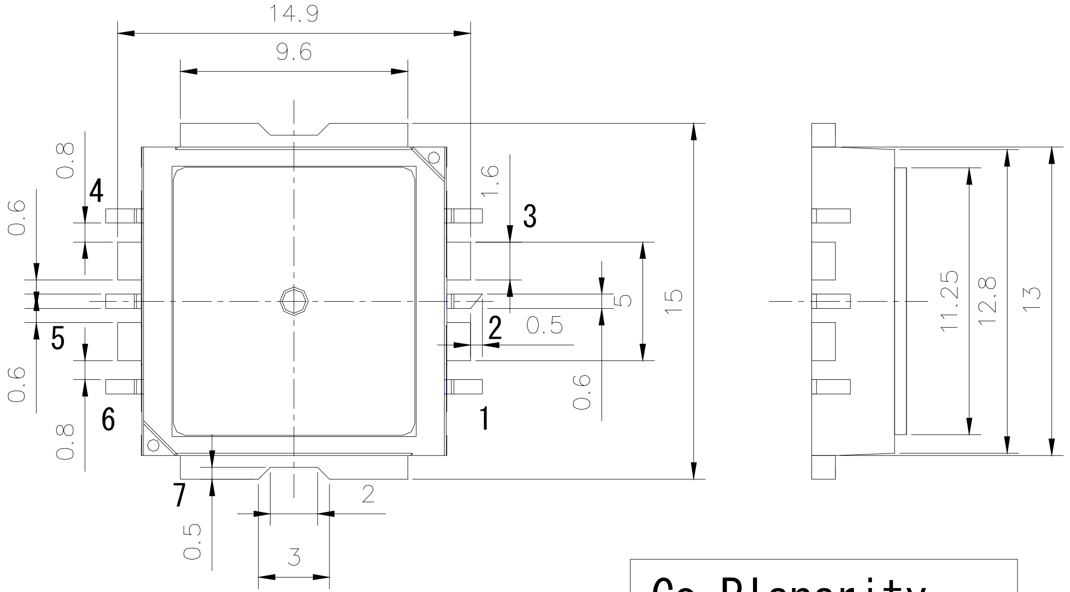


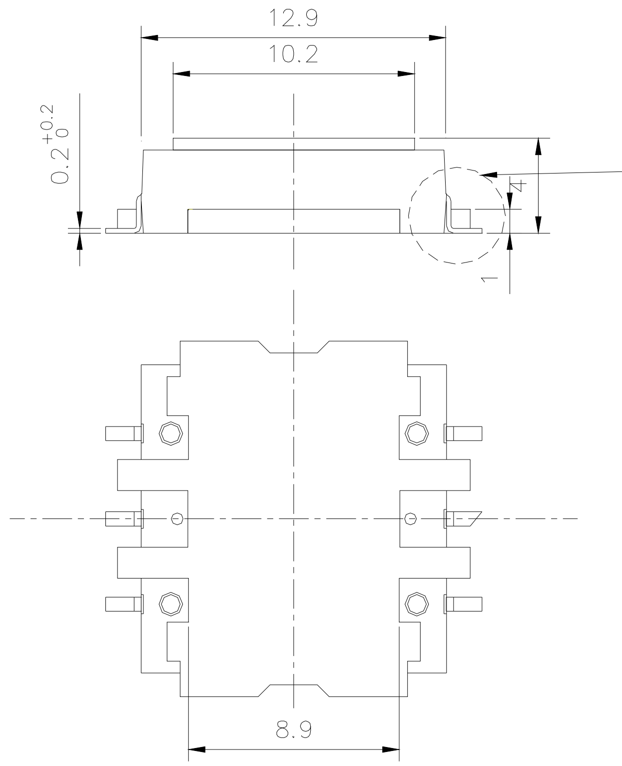


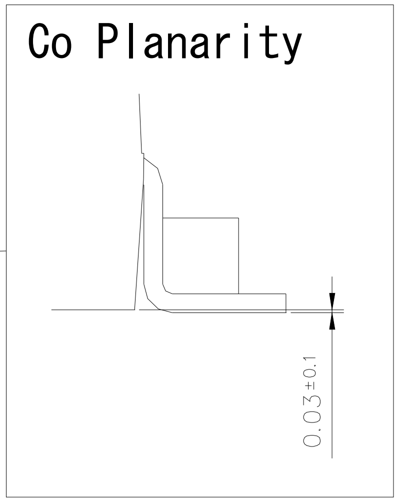
Frequency (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
7500	0.557	73.3	3.438	-127.6	0.026	-128.3	0.344	97.1
7600	0.514	55.2	3.413	-142.9	0.028	-146.0	0.350	78.0
7700	0.481	36.4	3.366	-158.1	0.028	-163.9	0.359	61.5
7800	0.455	17.6	3.279	-173.2	0.028	178.8	0.363	46.4
7900	0.440	0.8	3.233	172.5	0.027	162.3	0.363	33.0
8000	0.435	-13.8	3.164	158.4	0.027	148.4	0.362	21.2
8100	0.431	-27.4	3.148	144.7	0.027	134.6	0.365	9.8
8200	0.417	-41.2	3.200	130.5	0.027	119.5	0.363	-2.2
8300	0.380	-56.6	3.246	114.8	0.027	102.8	0.350	-14.9
8400	0.316	-74.6	3.233	98.1	0.026	84.3	0.321	-26.8
8500	0.233	-99.4	3.152	80.6	0.023	67.8	0.276	-36.5
8600	0.166	-139.9	3.003	63.3	0.020	50.2	0.232	-44.8
8700	0.174	166.9	2.778	46.5	0.017	36.6	0.181	-48.8



- **Package Out Line**



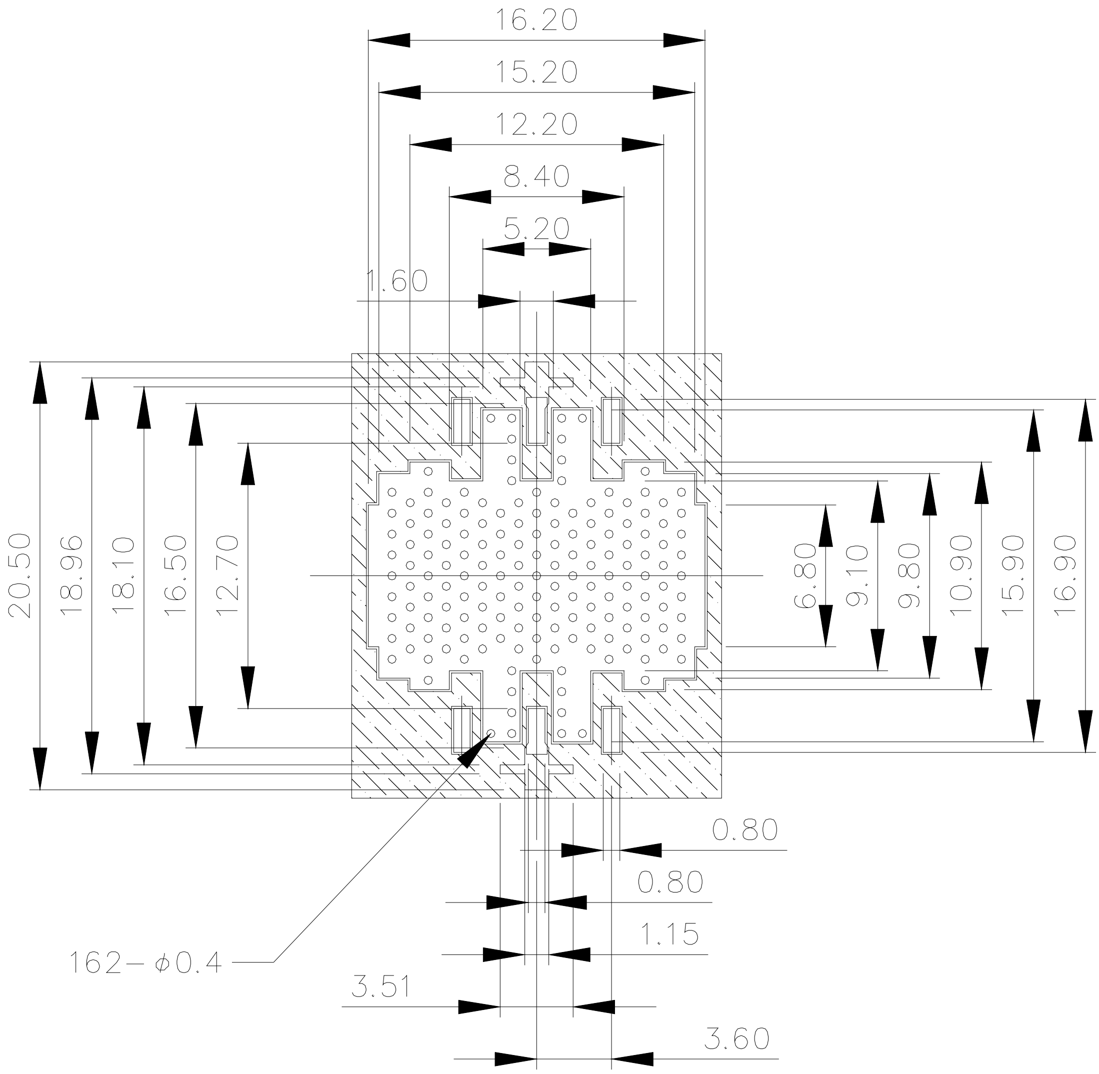




Pin Assignments

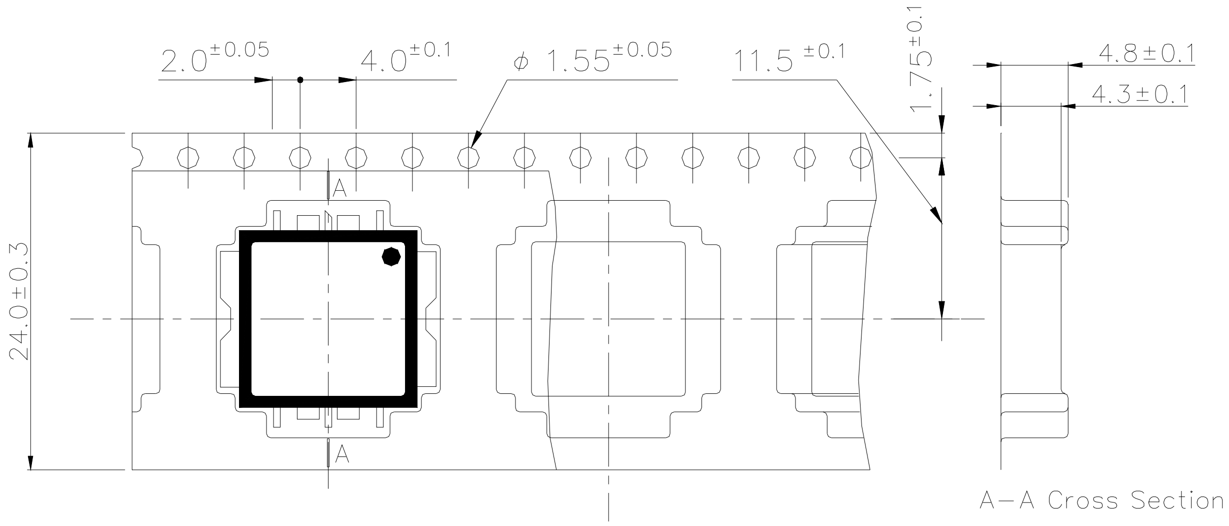
1 : NC
2 : Gate
3 : NC
4 : NC
5 : Drain
6 : NC
7 : Source

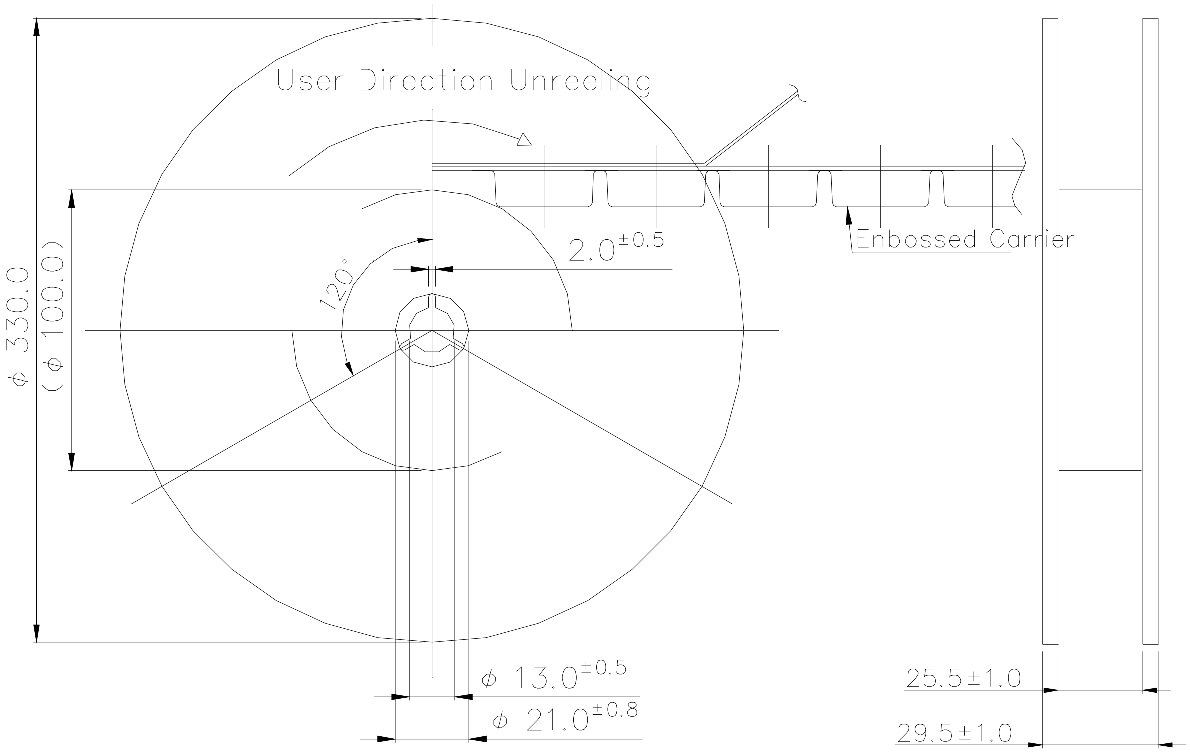
- **PCB Pads and Solder-Resist Pattern**



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

- **Marking and Tape/Reel Configuration**





Quantity: 500pcs/tape
Tape Material: Conductive PS

(unit in mm)

- **Mounting Instructions for Package for Lead-free solder**

Mounting Condition

For soldering, Lead-free solder (Sn-3.0Ag-0.5Cu)*1 which is no liquid cleaning type shall be used.

1. The example solder is a tin-rich alloy with 3.0% silver and 0.5% copper, often called Sn 96 for its approximate Tin content.
2. A rosin type flux with chlorine content of 0.2% or less shall be used. The rosin flux with low halogen content is recommended. When soldering, use the following time/ temperature profile with any of the methods listed for acceptable solder joints.
3. Make sure the devices have been properly prepared with flux prior soldering.

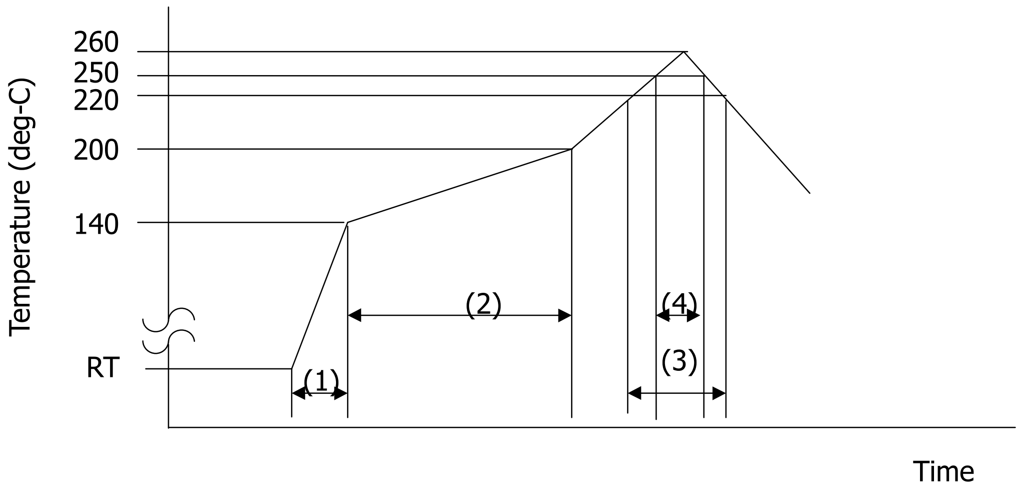
***Reflow soldering method (Infrared reflow / Heat circulation reflow / Hot plate reflow);**

Limit solder to 3 reflow cycles because resin is used in the modules manufacturing process.

Excessive reflow 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 lead.

- **Reflow temperature profile and condition:**



(1). Temperature rise: 3 deg-C/seconds.
(2). Preheating: 150 – 200 deg-C, 60 - 180seconds.
(3). Main heating: 220 deg-C, 60 seconds max.
(4). Main heating: 260 deg-C max., more than 250 deg-C, 20 - 40 seconds max.

* Measurement point: Device Heat-sink (Source Pin).

1. The above-recommended conditions were confirmed using the manufacturer’s equipment and materials. However, when soldering these products, the soldering condition should be verified by customer using their own particular equipment and materials.

- **Cleaning**

Avoid washing of the device after soldering by reflow method due to the risk of liquid absorption by the resin used in this part.

Humidity Lifetime for ELMxxxx-7PST

The following graph shows the effect of moisture on lifetime (moisture resistance) for the **ELMxxxx-7PST**. Each graph indicates the MTTF and failure rate prediction (Confidential Level = 90 %) which calculated from the results of highly accelerated temperature and humidity stress test (HAST).

Representative of device type : ELM7179-7PST

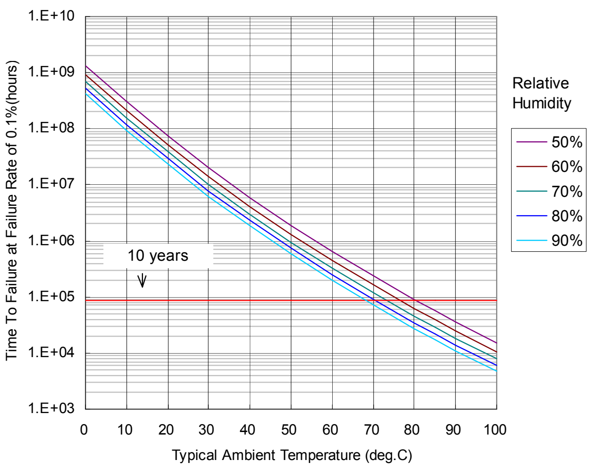
Subject of device type : ELMxxxx-7PST

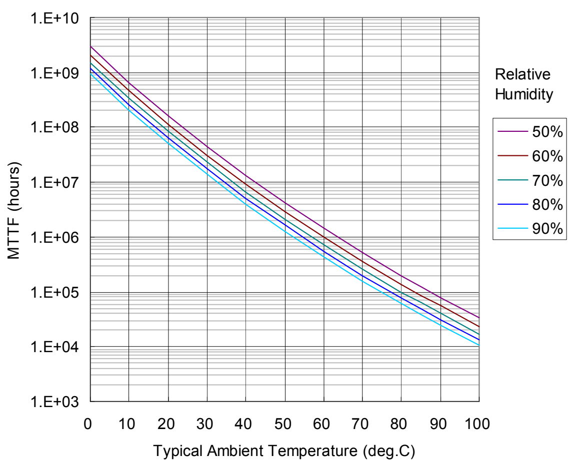
Field environmental conditions for operation

If the **ELMxxxx-7PST** is installed in a non-hermetic environment, please refer to 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. **ELMxxxx-7PST** 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.





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CAUTION

- Sumitomo Electric Device Innovations, Inc. products contain gallium arsenide (GaAs) which can be hazardous to the human body and the environment. For safety, observe the following procedures:
- Do not put these products 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.
- Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.