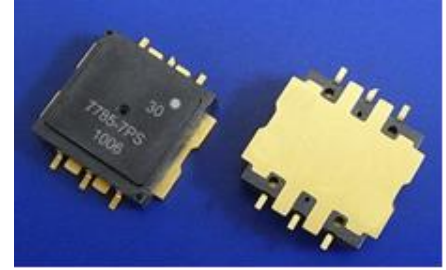


■ Features

- High Output Power: P1dB=39.0 dBm(Typ.)
- High Gain: G1dB=9.5dB (Typ.)
- High Power Added Efficiency: PAE=33% (Typ.)
- Broad Band: Frequency=7.7 to 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 $T_c=25$ 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	50	W
Storage Temperature	T_{stg}	-40 to +125	deg.C
Channel Temperature	T_{ch}	175	deg.C

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
Drain-Source Voltage	V_{DS}		<10	V
Forward Gate Current	I_{GF}	$R_g=100\Omega$	<+16	mA
Reverse Gate Current	I_{GR}	$R_g=100\Omega$	> -2.2	mA
Channel Temperature	T_{ch}		155	deg.C

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

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Saturated Drain Current	I_{DSS}	$V_{DS}=5V, V_{GS}=0V$	-	3400	5200	mA
Trans Conductance	g_m	$V_{DS}=5V, I_{DS}=2200mA$	-	3400	-	mS
Pinch-off Voltage	V_p	$V_{DS}=5V, I_{DS}=170mA$	-0.5	-1.5	-3.0	V
Gate-Source Breakdown Voltage	V_{GS0}	$I_{GS}=-170\mu A$	-5.0	-	-	V
Output Power at 1dB G.C.P.	P_{1dB}	$V_{DS}=10V$ $I_{DS}(DC)=2200mA(typ.)$ $f=7.7$ to 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	PAE		-	33.0	-	%
Gain Flatness	ΔG		-	-	1.2	dB
3rd Order Inter Modulation Distortion	IM_3	$f=8.5GHz$ $\Delta f=10MHz$, 2-tone Test $P_{out}=28.0dBm$ (S.C.L.)	-40.0	-43.0	-	dBc
Thermal Resistance	R_{th}	Channel to Case	-	2.5	3.0	deg.C/W
Channel Temperature Rise	ΔT_{ch}	$(V_{DS} \times I_{DSR} - P_{out} + P_{in}) \times R_{th}$	-	-	80.0	deg.C

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

CASE STYLE	I2C	
RoHS Compliance	YES	
ESD	Class 3A	4000V to < 8000V
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
ELM7785-7PS	15pcs	15pcs	50pcs-max./Tray , 1Tray-max./Packing
ELM7785-7PST	500pcs	500pcs	24mm width Tape (500pcs/Reel)

* MOQ stands for Minimum Order Quantity.

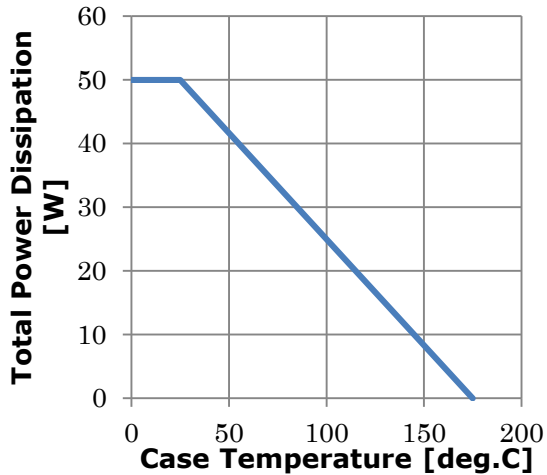
* MOU stands for Minimum Order Unit size.

Note

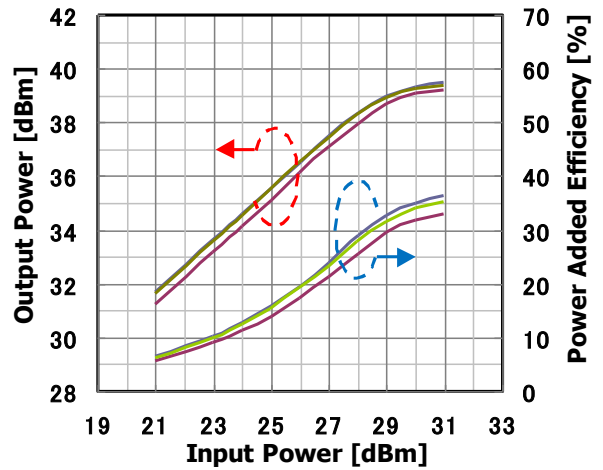
- This device will not be delivered with test data but tested pass/fail 100% against DC and RF specifications.
- NO liquid cleaning process is suitable for this device. (including de-ionized water or solvent)

● RF Characteristics

Power Derating Curve

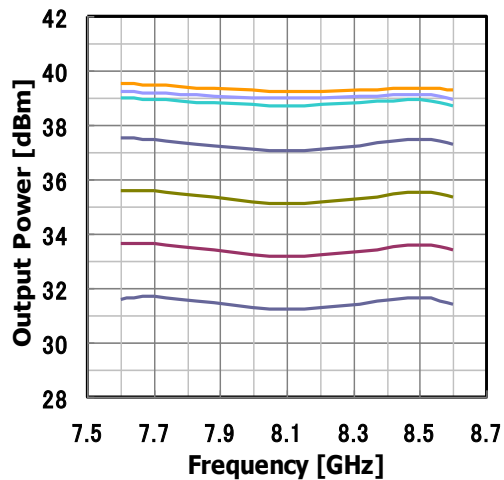


Input Power vs. Output Power and Power Added Efficiency
 $V_{DS}=10V, I_{DS(DC)}=2200mA$



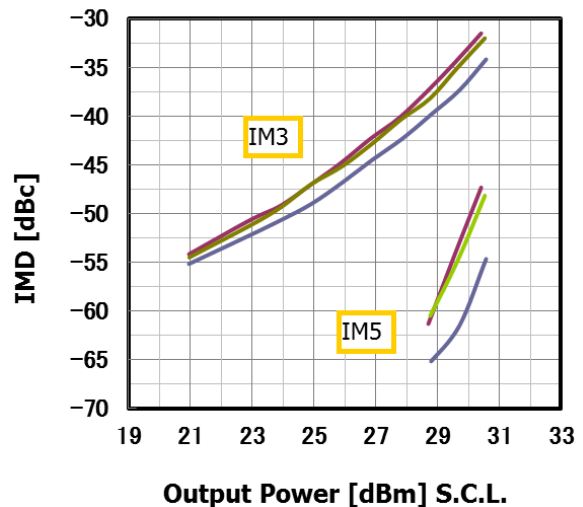
— 7.7 GHz — 8.1 GHz — 8.5 GHz

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



— 21 dBm — 23 dBm — 25 dBm — 27 dBm
 — 29 dBm — 31 dBm — P1dB

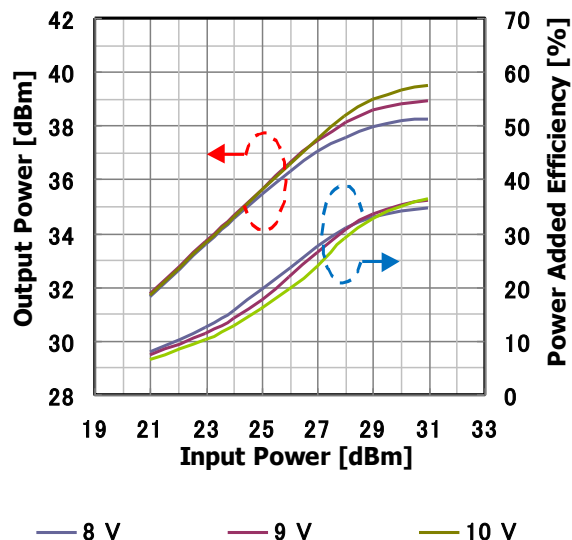
IMD vs. Output Power
 $V_{DS}=10V, I_{DS(DC)}=2200mA$



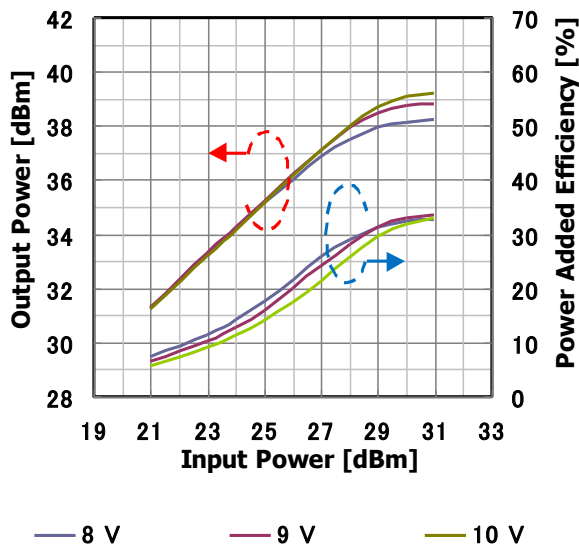
— 7.7 GHz — 8.1 GHz — 8.5 GHz

● RF Characteristics

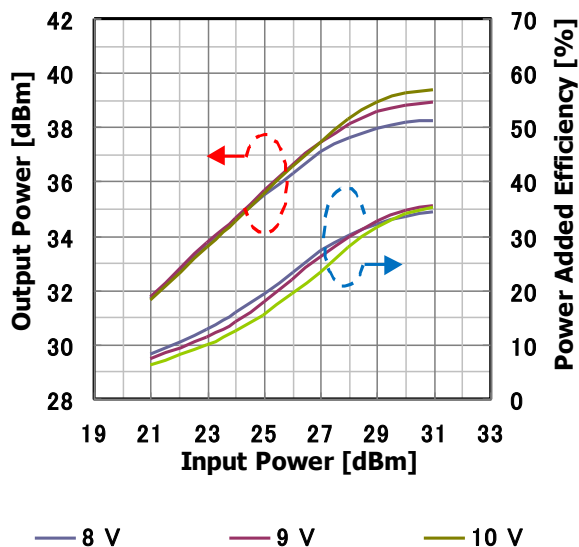
**Input Power vs. Output Power, Power
Added Efficiency by Drain Voltage**
 $I_{DS}(DC)=2200mA$ @7.7GHz



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

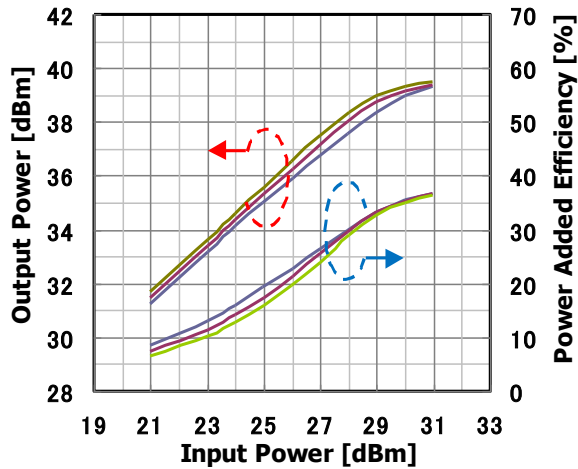


**Input Power vs. Output Power, Power
Added Efficiency by Drain Voltage**
 $I_{DS}(DC)=2200mA$ @8.5GHz



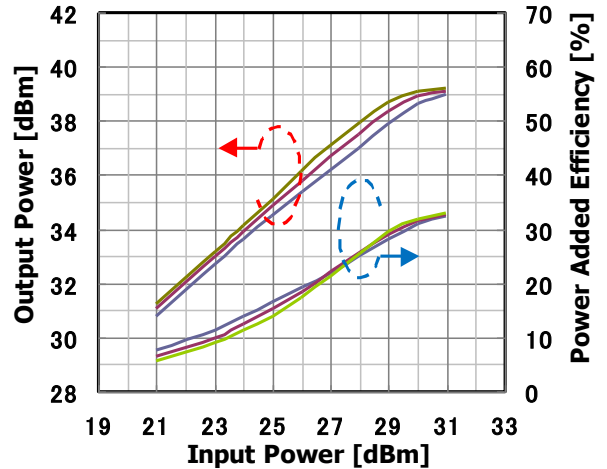
● RF Characteristics

Input Power vs. Output Power, Power Added Efficiency by Quiescent Drain Current
VDS=10V @7.7GHz



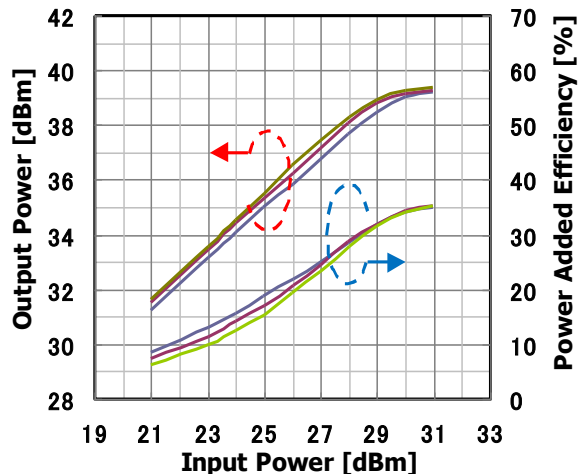
— 1400 mA — 1800 mA — 2200 mA

Input Power vs. Output Power, Power Added Efficiency by Quiescent Drain Current
VDS=10V @8.1GHz



— 1400 mA — 1800 mA — 2200 mA

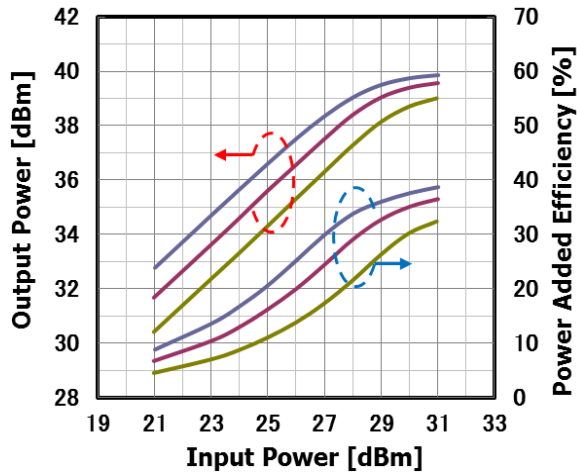
Input Power vs. Output Power, Power Added Efficiency by Quiescent Drain Current
VDS=10V @8.5GHz



— 1400 mA — 1800 mA — 2200 mA

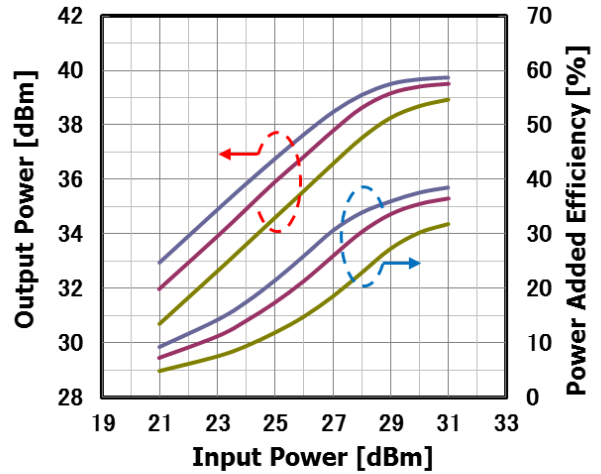
● RF Characteristics

Input Power vs. Output Power, Power Added Efficiency by Case Temperature
VDS=10V IDS(DC)=2200mA @7.7GHz



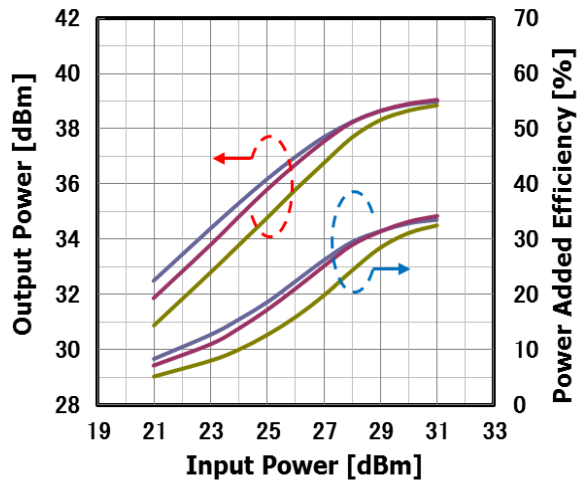
— -40 deg.C — 20 deg.C — 80 deg.C

Input Power vs. Output Power, Power Added Efficiency by Case Temperature
VDS=10V IDS(DC)=2200mA @8.1GHz



— -40 deg.C — 20 deg.C — 80 deg.C

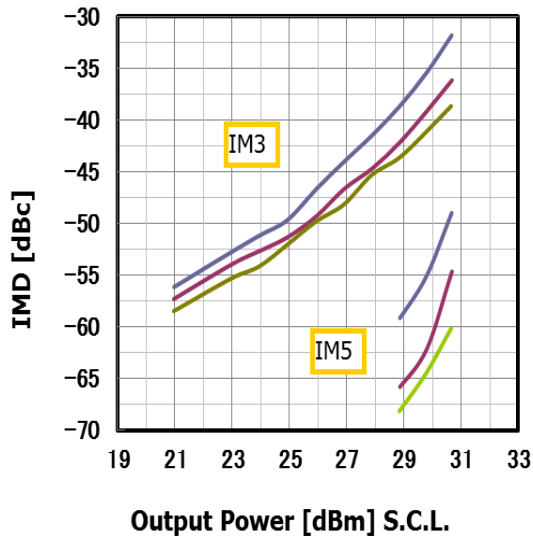
Input Power vs. Output Power, Power Added Efficiency by Case Temperature
VDS=10V IDS(DC)=2200mA @8.5GHz



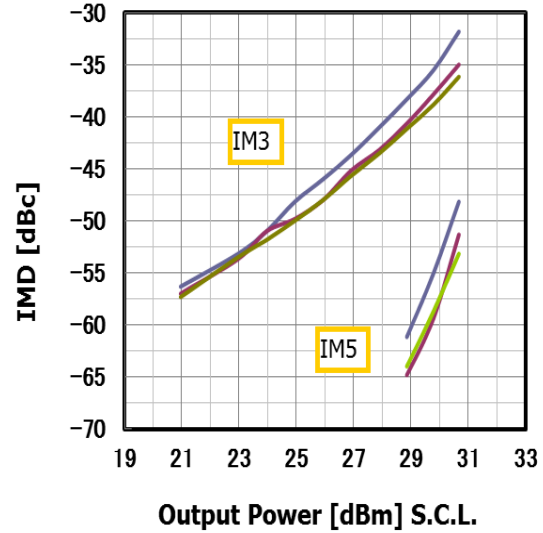
— -40 deg.C — 20 deg.C — 80 deg.C

● RF Characteristics

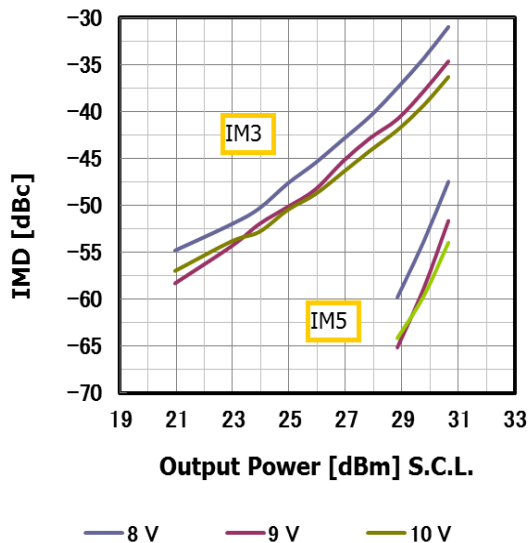
**IMD Performance vs. Output Power
by Drain Voltage**
 $I_{DS}(DC)=2200mA$ @7.7GHz



**IMD Performance vs. Output Power
by Drain Voltage**
 $I_{DS}(DC)=2200mA$ @8.1GHz

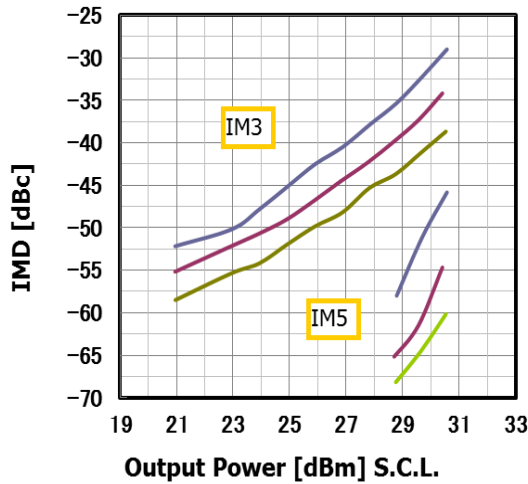


**IMD Performance vs. Output Power
by Drain Voltage**
 $I_{DS}(DC)=2200mA$ @8.5GHz

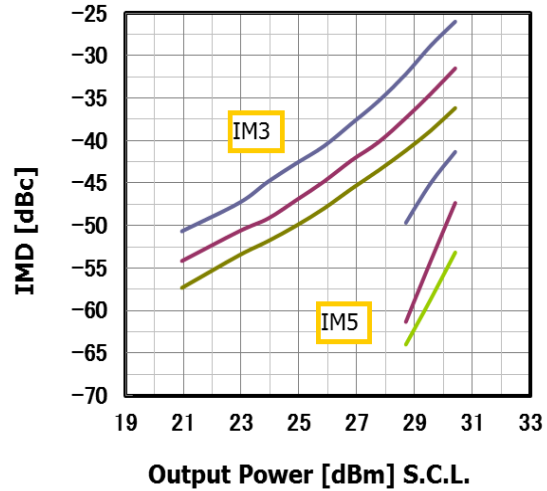


● RF Characteristics

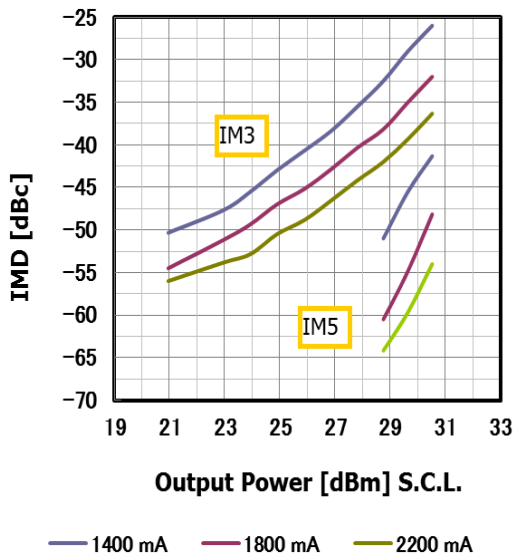
**IMD Performance vs. Output Power by
Quiescent Drain Current**
VDS=10V @7.7GHz



**IMD Performance vs. Output Power by
Quiescent Drain Current**
VDS=10V @8.1GHz

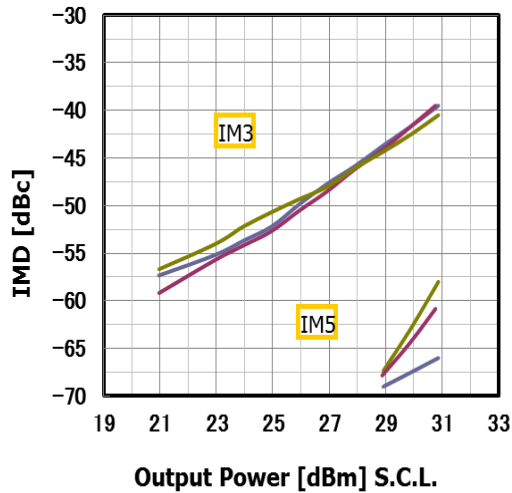


**IMD Performance vs. Output Power by
Quiescent Drain Current**
VDS=10V @8.5GHz

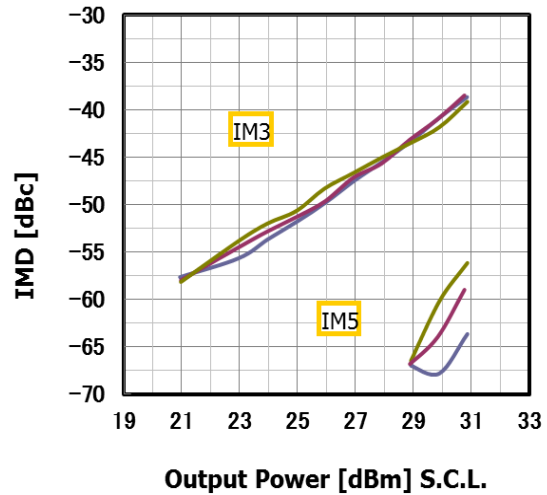


● RF Characteristics

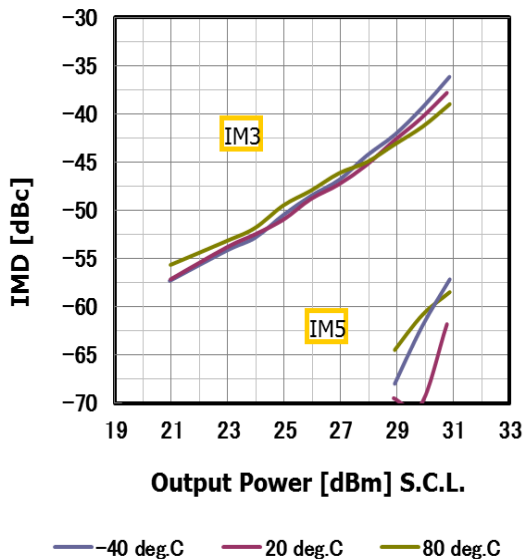
**IMD Performance vs. Output Power
by Case Temperature**
VDS=10V IDS(DC)=2200mA @7.7GHz



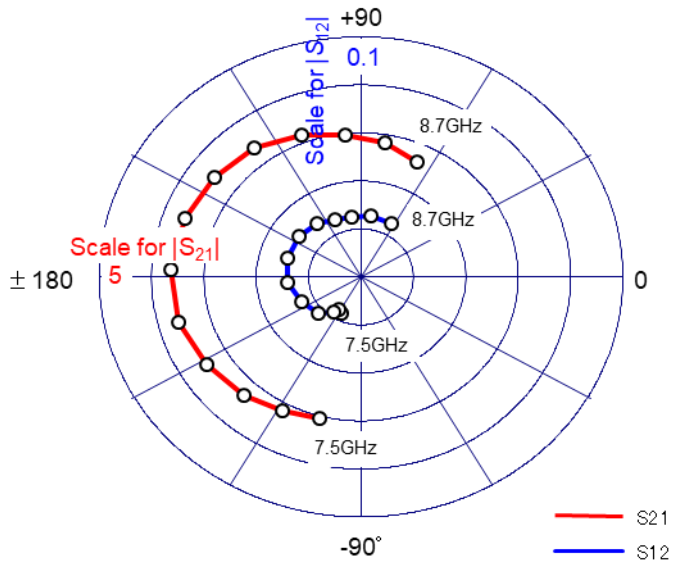
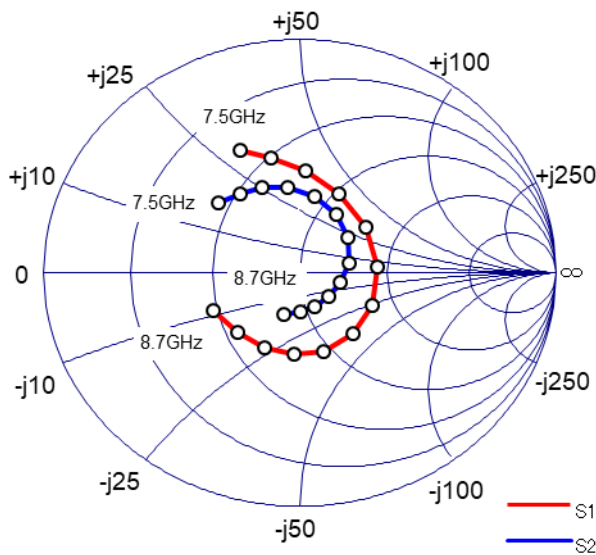
**IMD Performance vs. Output Power
by Case Temperature**
VDS=10V IDS(DC)=2200mA @8.1GHz



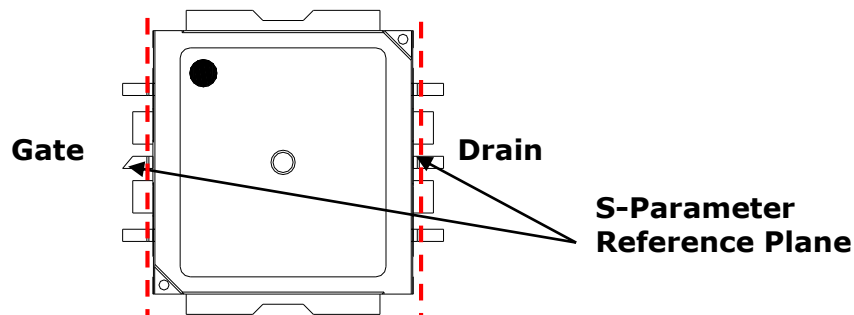
**IMD Performance vs. Output Power
by Case Temperature**
VDS=10V IDS(DC)=2200mA @8.5GHz



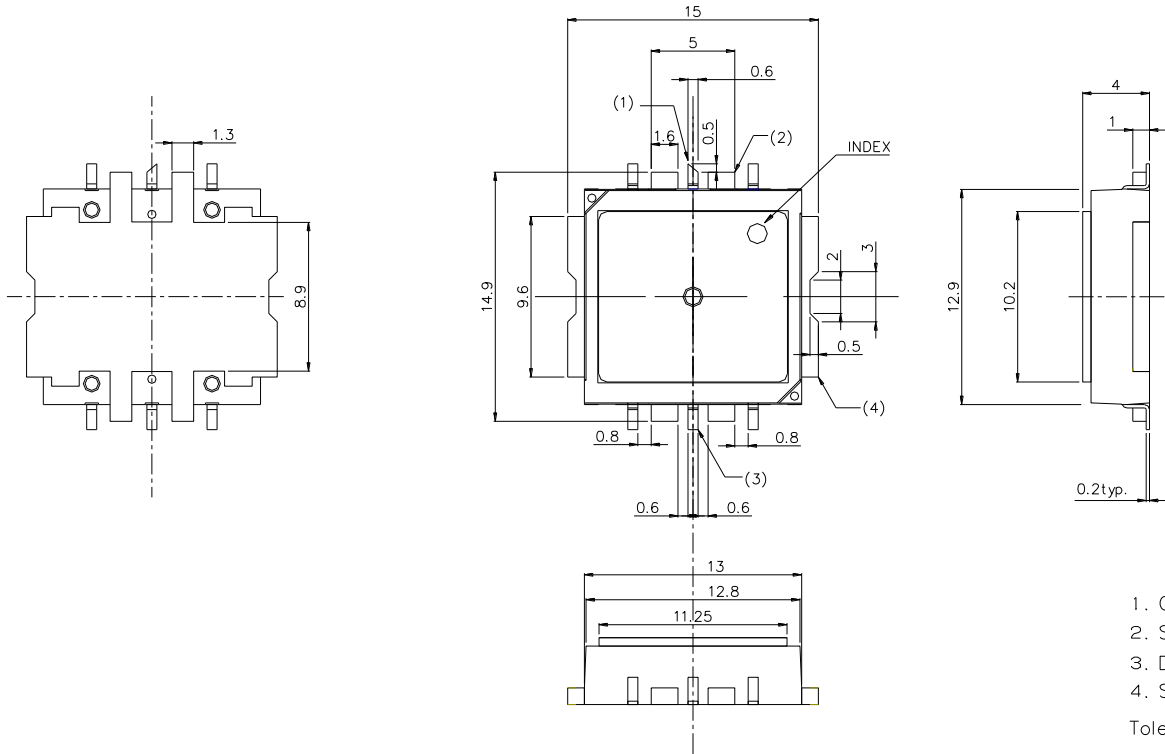
● S-Parameter



Frequency (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
7500	0.573	113.6	3.050	-105.1	0.017	-115.5	0.436	136.4
7600	0.505	102.5	3.163	-118.5	0.016	-121.7	0.412	124.2
7700	0.437	87.2	3.328	-132.2	0.018	-125.5	0.393	111.8
7800	0.374	65.4	3.480	-148.2	0.022	-137.2	0.370	97.0
7900	0.324	36.7	3.612	-165.0	0.025	-156.3	0.332	79.7
8000	0.306	4.5	3.634	177.7	0.028	-175.4	0.289	60.7
8100	0.316	-25.8	3.585	160.2	0.029	164.8	0.243	38.5
8200	0.335	-51.4	3.492	143.6	0.029	144.9	0.197	13.1
8300	0.348	-74.0	3.371	127.0	0.028	126.8	0.166	-14.6
8400	0.346	-93.8	3.165	111.2	0.026	112.0	0.152	-42.5
8500	0.346	-113.1	2.984	95.8	0.025	97.8	0.154	-67.2
8600	0.352	-133.6	2.822	80.8	0.026	81.6	0.168	-88.8
8700	0.372	-154.6	2.616	65.9	0.025	62.3	0.185	-109.1



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

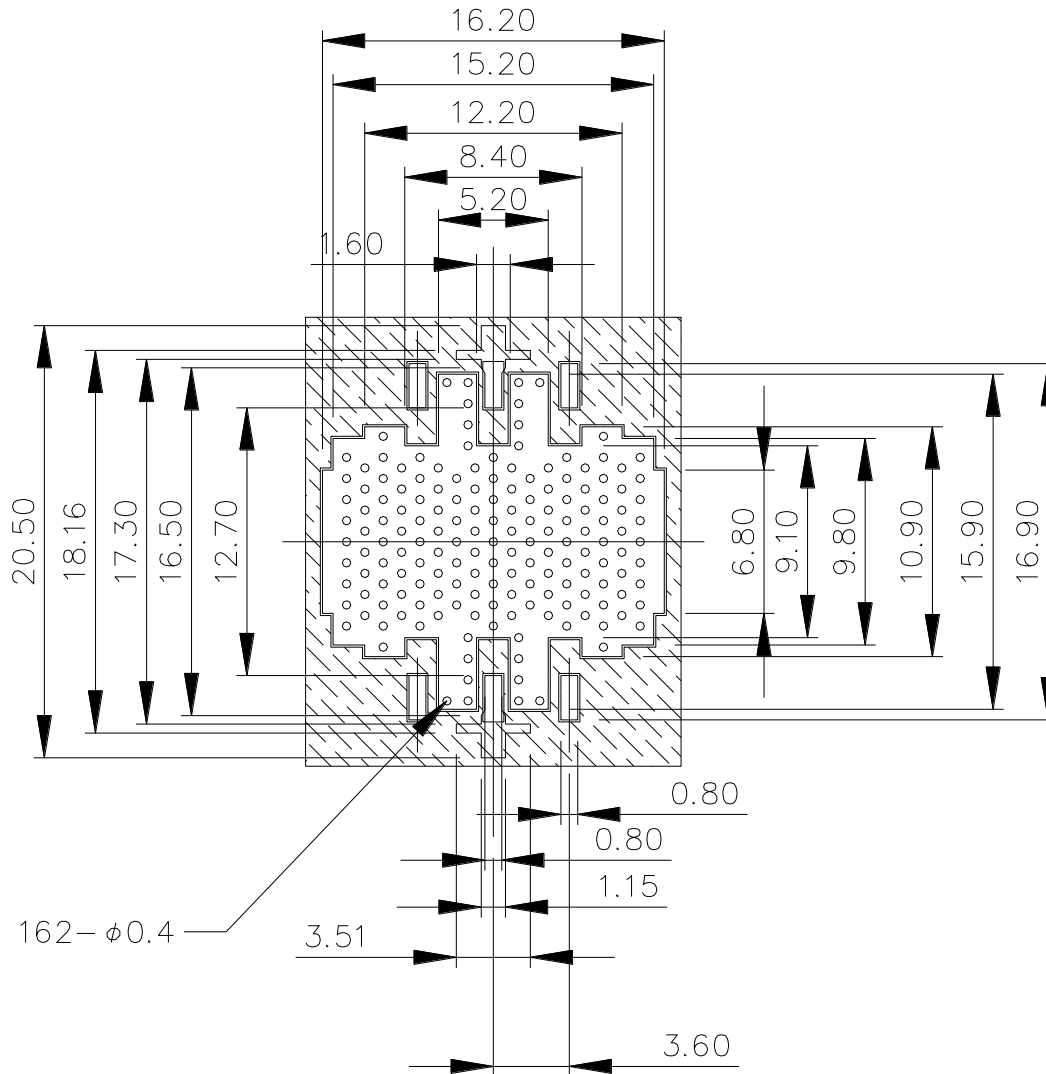


1. Gate
2. Source
3. Drain
4. Source

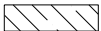
Tolerance : ± 0.15

Unit: mm

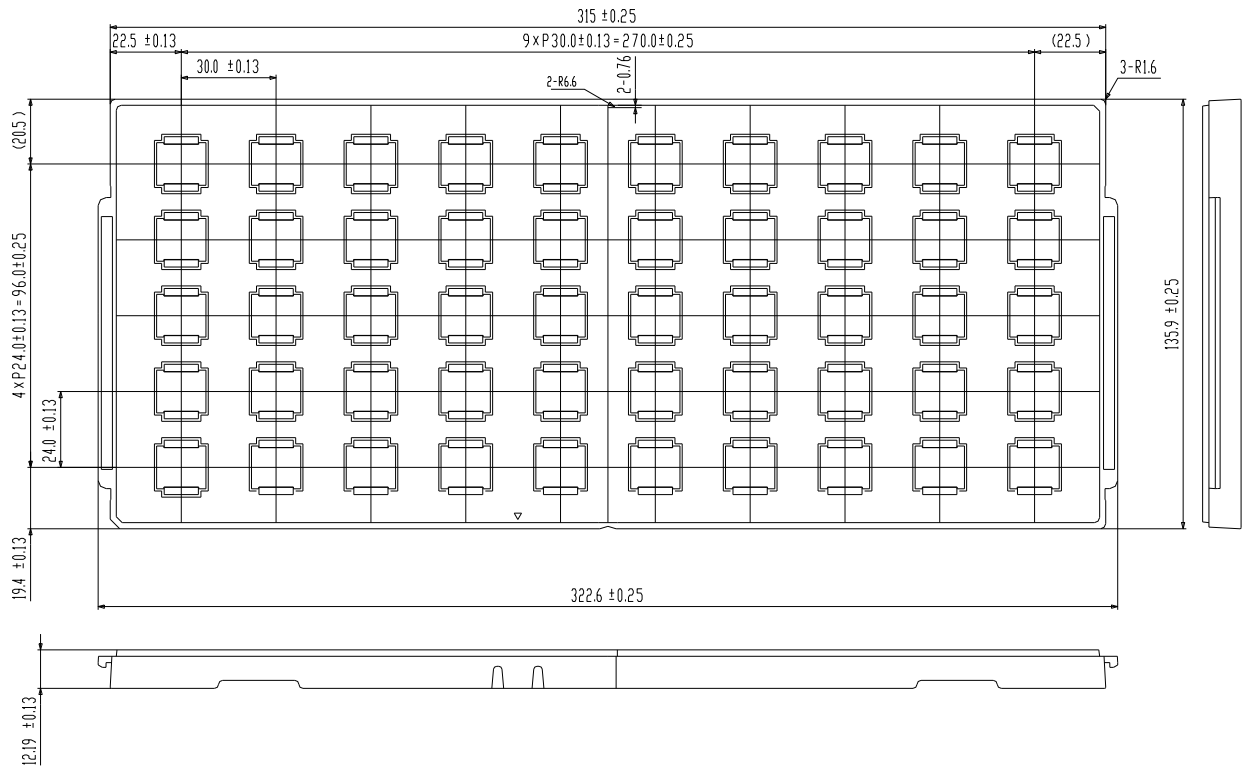
● **PCB Pads and Solder-Resist Pattern**



Notes :

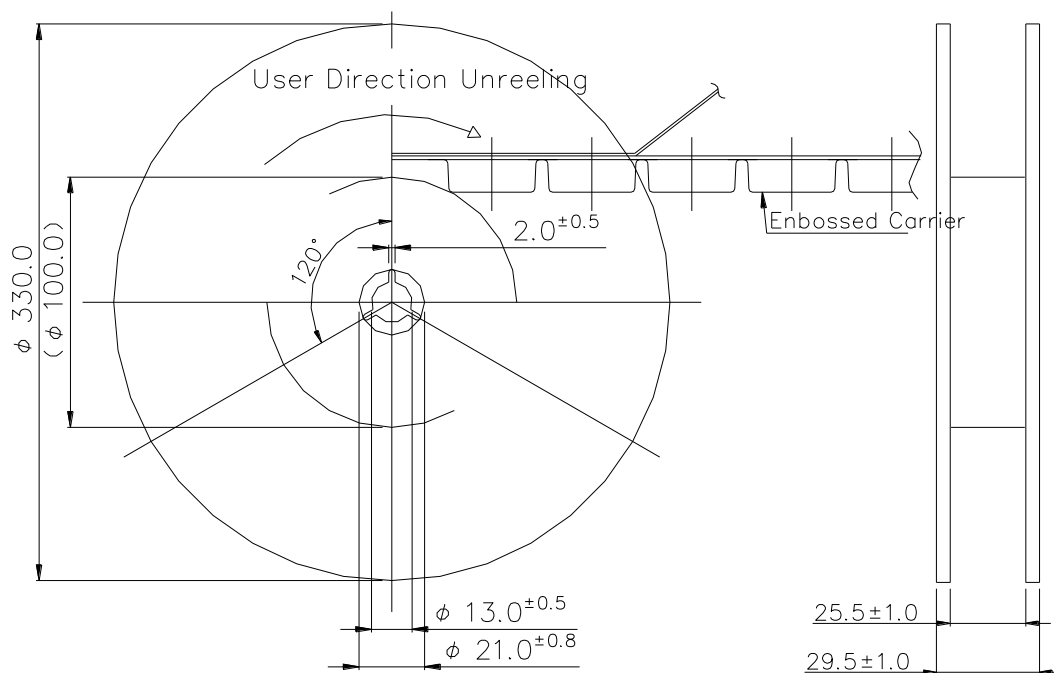
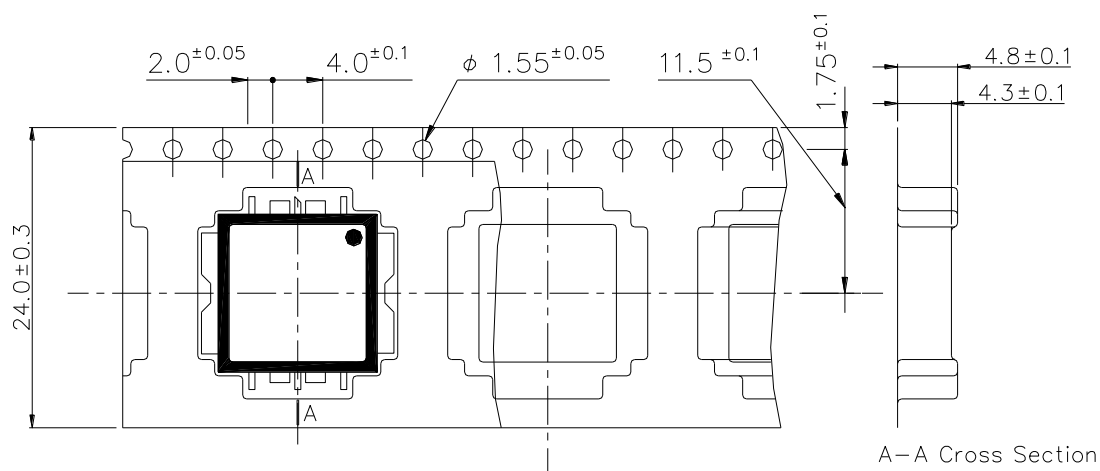
1. Laminate : Rogers Corporation R04003, Thickness $t=0.508\text{mm}$, Cu Foil $18\mu\text{m}$.
Finish to copper foil : Ni $0.1\mu\text{m}$ min. / Au $0.1\mu\text{m}$ (Both side).
2.  : Resist

- **JEDEC Tray Dimension (Part No:ELM7785-7PS)**





● **Tape/Reel Configuration**
(Part No:ELM7785-7PST)



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 or equivalent 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.

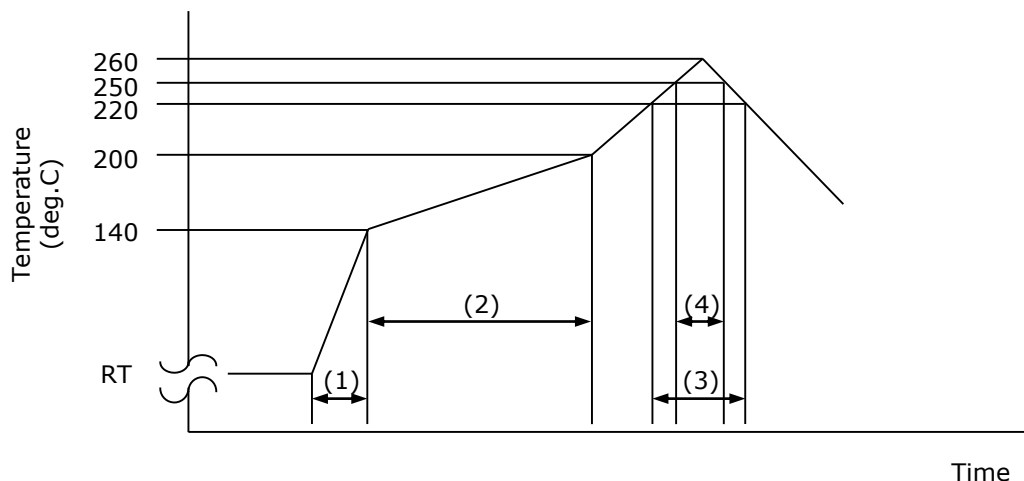
* Reflow soldering method (Infrared reflow / Heat circulation reflow / Hot plate reflow);

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 to 200 deg.C, 60 to 180seconds.
 - (3). Main heating: 220 deg.C, 60 seconds max.
 - (4). Main heating: 260 deg.C max., more than 250 deg.C, 20 to 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

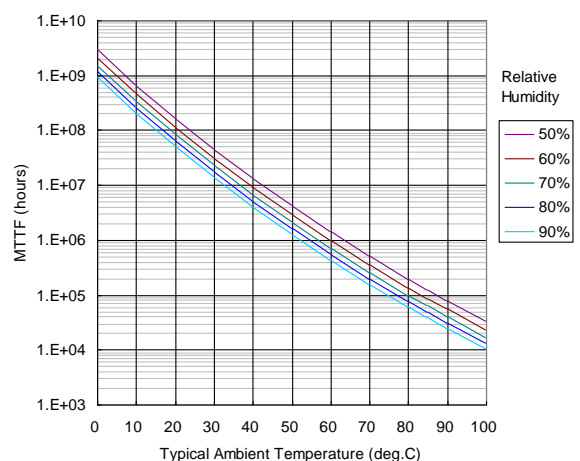
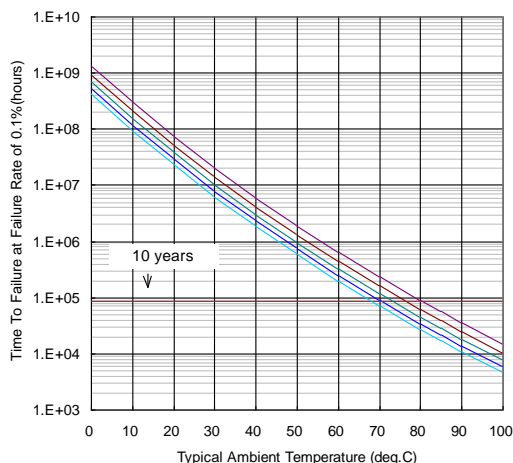
Subject of device type : ELMxxxx-7PST

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.



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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