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Subject : Regarding the change to dual vender system of the heat-sink for MITSUBISHI Silicon RF modules.
Peport to you reliability test result.

Regarding the plans to change dual vender system from existing one vender for procurement of modules heat-sink. *1)

We evaluated that there is no problem for RF characteristics, reliability.

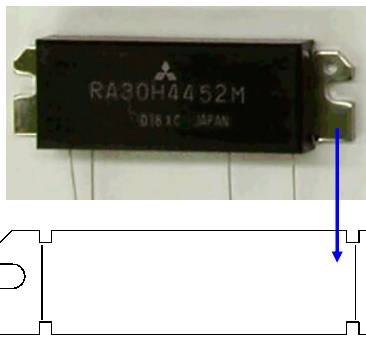
As a result, We secure good a reliability level same as current module by Comparison result of the RF characteristics, Stability evaluation (Temperature cycling test, Humidity storage test, RF operation test).

There is not the influence by change to dual vender system.

We guarantee level as is conventionally done.

*1) Report number : G2K-R-101227-2

● **Products subject, Reason of change, Change schedule**

Subject	Product name		MOS FET Modules (RA series)		Detail chart for heat-sink.							
	Package outline		H2S package (Page3 shows type number list.)		 Figure, Detail chart for heat-sink.							
Reason of change	Reason of change	Stable procurement,stable production.										
	Changed contents	We will change to dual vender system.										
	Current		New									
	Domestic one maker.		Dual vender system. (One is the domestic maker,the other one is a foreign maker.)									
Change schedule	● Change schedule											
		Dec.2010	Jan.2011	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	① An evaluation for RF characteristics and reliability of the representative product. (Representative product : RA45H4452M) Page3 shows Result of evaluation	completed										
	② A mass production starting of representative product. (Representative product : RA45H4452M)											
	③ A mass production starting of the other than representative product.											
We have plans to apply in mass production as follows.												
・A mass production starting of representative product in March. (Representative product : RA45H4452M)												
・A mass production starting of the other than representative product in September.												

Other: This change is regarding the change to dual vender system. Hence, there is no change the base material, plating, dimension of heat-sink.

G2K-R-110304-3

●Comparison result of the RF characteristics.

We carried out characteristic comparison of the representative product. (UHF Band/45W : RA45H4452M*2)
We show the result of RF Characteristic/Load VSWR Tolerance/Stability as follows.

*2) RA45H4452M has high junction temperature, and most fever of all modules.

(1)RF Characteristic

■Test condition: $f=440/480/490\text{MHz}/520\text{MHz}$, $V_{dd}=12.5\text{V}$, $P_{in}=50\text{mW}$, $Z_g=50\Omega$, $V_{SWR}1:1$

■Result : There is not the influence, and it is a characteristic same as current module.

(2)Load VSWRT Tolerance

■Test condition: $f=440/520\text{MHz}$, $V_{dd}=12.5\text{V}$, $P_{in}=50\text{mW}$, $P_{out}=57\text{W}$ (Vgg control)

$Z_g=50\Omega$, $V_{SWR}20:1$ All phase

■Result : RFLoad VSWR Tolerance is the same as current module.

There is not degradation and not destroy.

(3)Stability

■Test condition: $f=440/480/490/520\text{MHz}$, $V_{dd}=10-15.2\text{V}$, $P_{in}=25-70\text{mW}$, $P_{out}=55\text{W}$ (Vgg control)

$Z_g=50\Omega$, $V_{SWR}3:1$ All phase $T_c=-30^\circ\text{C}/25^\circ\text{C}$

■Result : Stability is the same as current module.

There is not not found oscillation spectrum.

●Result of Stability evaluation

We shows the result of Temperature cycling test/Humidity Strage test/RF operation as follows.

(1)Temperature cycling

■Result : Temperature cycling test result are within specifications,same reliability level with current module.

Test condition	QTY of sample	failure
$-40^\circ\text{C}/125^\circ\text{C}$ 210cycle	22pcs	0pcs
Fairure Criteria: $\Delta P_o=\pm 20\%$, $\Delta \eta T=\pm 20\%$		

(2)Humidity Storage

■Result : Humidity storage test result are within specifications,same reliability level with current module.

Test condition	QTY of sample	failure
$85^\circ\text{C}/85\%\text{RH}$ 1000hours	22pcs	0pcs
Fairure Criteria: $\Delta P_o=\pm 20\%$, $\Delta \eta T=\pm 20\%$		

(3)RF operation

■Result : RF Operation test result are within specifications,same reliability level with current module.

Test condition	QTY of sample	failure
$f=480\text{MHz}$ $P_{in}=50\text{mW}$ $P_o=46\text{W}$ (Vgg adj) ON/OFF=2min/3min ($\Delta T_c=60^\circ\text{C}$) 8000cycle	8pcs	0pcs
Fairure Criteria: $\Delta P_o=\pm 20\%$, $\Delta \eta T=\pm 20\%$		

●Type number list of 「H2S」package outline.

Type number	
RA03H3334MD	RA30H1317M
RA08H3843MD	RA30H1721M
RA08H4547MD	RA30H2127M
RA13H1317M	RA30H3340M
RA13H3340M	RA30H4047M
RA13H3435M	RA30H4047MA
RA13H4047M	RA30H4452M
RA13H4452M	RA30H4452MA
RA13H4647M	RA35H1516M
RA13H8891MA	RA45H4045MR
RA13H8891MB	RA45H4047M
RA13H8891MC	RA45H4452M
RA18H1213G	RA45H8087M
RA18H1213G1	RA55H3340M
RA20H2627MD	RA55H3847M
RA20H8087M	RA55H4047M
RA20H8994M	RA55H4047MA
RA20N1516M	RA55H4452M
RA30H0608M	RA60H1317M