

MITSUBISHI

High Frequency MOSFET devices

Lead Free Status & Roadmap

June, 2004

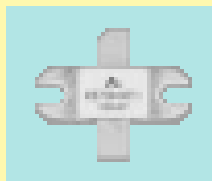
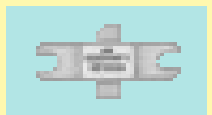




Mitsubishi Electric Co.
High Frequency & Optical Device Works

Miyoshi Electronics Co.
Electronic Devices Div.

SiRF Pb Free Road Map For New MOS Products

Issues	2003	2004				2005			
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
For Discrete MOS FETs									
Material Investigation									
Solder For Die Bonding	→	Completed							
Finished Plating	→	Completed							
Outer Lead (Electrode)	→	Completed							
Investigation of Productability and Usability		→							
Confirm Reliability			→						
In-Line Production						→	→	→	→
For RF Module									
Material Investigation									
Pb Free Status of Chip Devices.	→	Completed							
Solder for Attaching Chip Devices on the Surface of the Dielectric Substrate.		→							
Solder for Attaching Dielectric Substrate (Al ₂ O ₃) and Heat Sink (Fin or Flange)		→							
Possibility Investigation of the Module Structure and Process		→							
Process Change Confirmation. Trial and Test			→						
Confirm Reliability					→				
In-Line Production							→	→	→

Pb Free Plan For Discrete RF MOS FETs


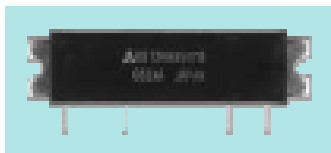
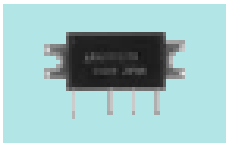
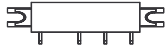
Outline	Structure	Type Examples	Current	Pb Free	Remark
	Ceramic PKG with Fin T31S T40S	<i>RD70HVF1</i> <i>RD60HUF1</i> <i>RD45HMF1</i> <i>RD70HHF1</i> <i>RD100HHF1</i>	Ni+Au	Ni+Au	Note 1
		<i>RD30HVF1</i> <i>RD30HUF1</i> <i>RD20HMF1</i>	Ni+Au	Ni+Au	Note 1
	Ceramic SMD PKG	<i>2SK2974</i> <i>2SK2975</i>	Ni+Au	Ni+Au	Note 1
	Plastic Molded SMD SLP	<i>RD07MVS1</i> <i>RD02MUS1</i>	Ni+Au	Ni+Au	Note 1
	TO-220 Similar Plastic Molded PKG	<i>RD15HVF1</i> <i>RD16HHF1</i> <i>RD06HHF1</i>	PbSn	SnAg or SnBi	
	SC-62(SOT-89) Molded PKG	<i>RD00HVS1</i> <i>RD01MUS1</i>	PbSn	SnBi	Note 2

Note 1: Lead Free from start of production

Note 2: Using PbSnAg Solder For Die Bonding. PbSnAg which is High Melting Temp. Solder Including 85% Pb. This kind of Solder is a exception from the RoHS Restriction.

MITSUBISHI ELECTRIC HF&Optical Device Works (MIYOSHI ELECTRONICS)

Pb Free Plan For RF Modules

Outline	Structure	PKG#	Type Examples	Part	Current	Pb Free
	H/P Module PKG L	H2S H2RS	<i>RA13H, RA30H RA45H, RA60H RA35H, RA20H Series</i>	Lead Finish :	Sn Plating	Sn Plating
				Chip Attach :	PbSnAg	SnAgCu
				Substrate Attach :	InPbAg	Under Consideration
	H/P Module PKG M	H11S	<i>RA13H8891MB RA06H8285M</i>	Lead Finish :	Sn Plating	Sn Plating
				Chip Attach :	PbSnAg	SnAgCu
				Substrate Attach :	InPbAg	Under Consideration
	Handy Module PKG	H46S	<i>RA03M, RA07M RA07N, RA07H Series</i>	Lead Finish :	Sn Plating	Sn Plating
				Chip Attach :	PbSnAg	SnAgCu
				Substrate Attach :	PbSnAg	Under Consideration
	Handy Module PKG SMD	H46 SMD	<i>RA07M1317MS RA07M4047MS RA07M4452MS</i>	Lead Finish :	PbSnAg	SnAg or SnBi or Sn
				Chip Attach :	PbSnAg	SnAgCu
				Substrate Attach :	PbSnAg	Under Consideration

**Note: High Melting Temperature Solder Including 85% Pb is an exception from the RoHS Restriction.
Therefore this kind of solder will be used after year 2005.**

Pb Free Recommendation

Recommended Reflow Temperature Profile

