

## APPLICATION NOTES FOR SMT DEVICES

Dorado International SMT devices use a single ferrite element with a circuit pattern on one face and the ground plane on the other. With a permanent magnet structure included on the ferrite substrate, Dorado International devices are complete, self-contained and fully functional ferrite devices.

- **Features:**
  - Small size, light weight
  - Low cost
  - Broad offering
  - High performance
  - Custom design
  - Lead free and ROHS compliant
- **Frequency range:**
  - Standard frequency range of 5 to 27GHz
- **Mechanical mounting:**
  - SMT devices should be mounted on a nonmagnetic basis.
  - Maximum temperature soldering process:
    - If the plating of the SMT device is gold then use Pb free and Sn free solder. The recommended solder should be 97% In plus 3% Ag with the maximum melting point of 150°C. The maximum processing time is 1 minute.
    - If the plating of the SMT device is silver then use a Pb free reflow profile up to a peak temperature of 250°C within 40 seconds.
- **Temperature range:**
  - Standard temperature range –30 to 65°C, Do not heat above 130°C.
  - Electrical parameters perform over the standard operating temperature range
  - Other temperature ranges are available
- **Magnetic fields and materials:**
  - Devices typically exhibit a fringing magnetic field which is less than 1 gauss at the distance of 12.7 mm. Electrical performance may be affected if device is mounted on or very close to magnetic material or exposed to strong magnetic fields from nearby magnetic devices
- **Handling:**
  - Handle with care, using nonmagnetic tools only
- **Environmental:**
  - Operate in waterproof equipment only
  - Humidity up to 95% noncondensing
- **Thermal resistance:**
  - Must not be higher than  $10^{-4}$  m<sup>2</sup>K / W
- **Custom features:**
  - Ability to provide a wide range of solutions to meet most applications

## Recommended Soldering Parameters

### Introduction

The purpose of the following discussion is to define recommended soldering techniques and parameters for Dorado International products. Using these techniques and parameters will prevent damage to the SMT devices through the soldering processes and help ensure product quality and reliability.

### Convection Reflow Soldering Parameters

Surface Mount Technology (SMT) reflow parameters are primarily a function of solder paste chemistry and board technology. Therefore, Dorado International’s first order recommendation is to follow the solder paste supplier’s soldering parameters, while not violating the maximum parameters listed in Table 1. These parameters apply to both mass SMT assembly and individual site rework. The following information describes Dorado International convection reflow soldering parameters for mass SMT assembly and *reworked products*. Dorado International floor-life recommendations, based on the moisture sensitivity level of the component, are designed to prevent component damage during reflow processing. The component packaging label notes the rated floor life for each type of component. The moisture sensitivity level is determined in accordance with J-STD-020A, “Moisture/ Reflow Sensitivity Classification for Non-Hermetic Solid State Surface Mount Devices.”

**Note:** These guidelines also apply to component removal from board assemblies.

Figure 1, Illustration of a Reflow Heating Profile, on the next page, shows examples of reflow heating profiles for various maximum peak temperatures.

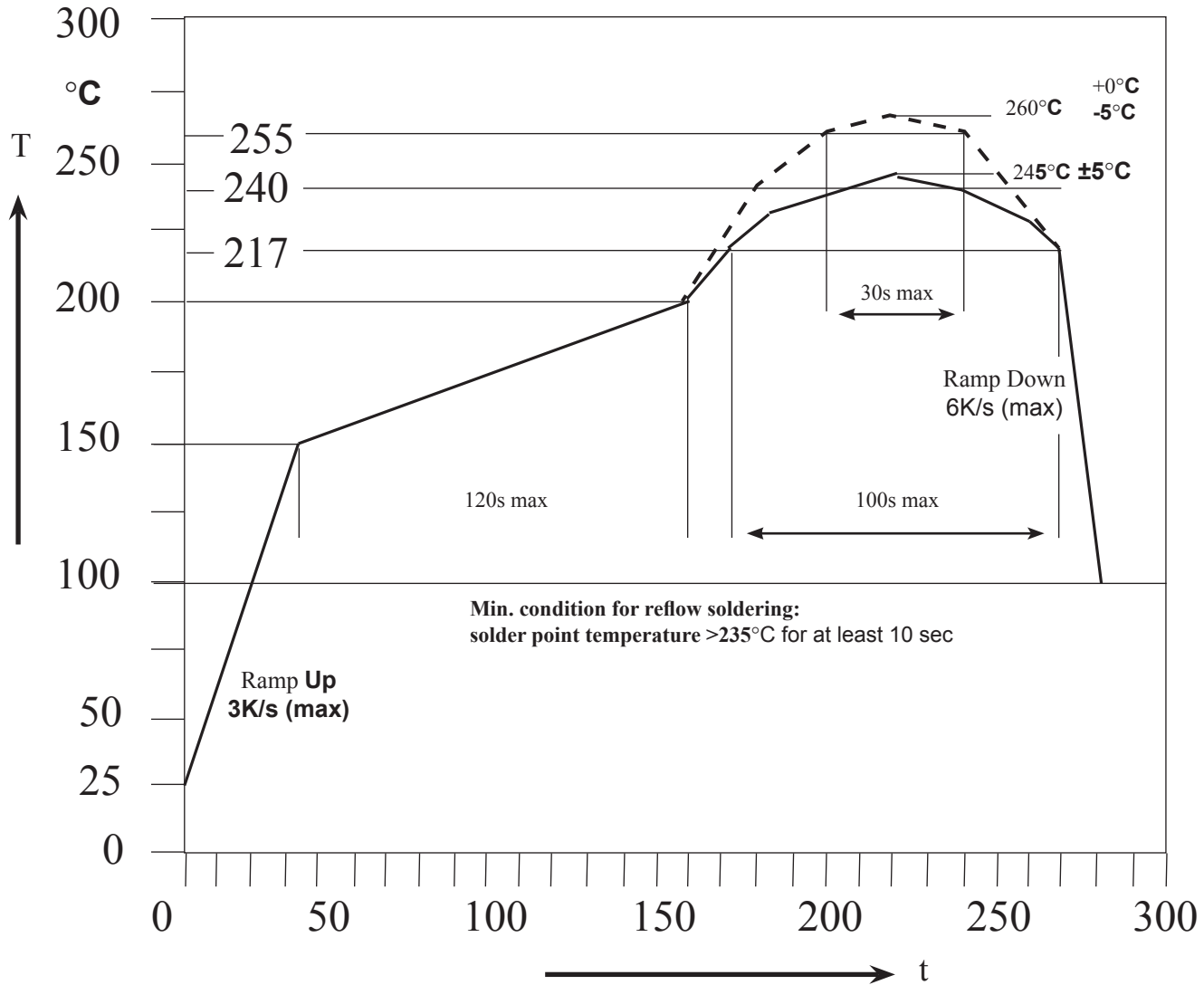
**Table 1: Convection Reflow Soldering Parameters**

	MAX PEAK TEMPERATURE	MAX DWELL TIME @ PEAK	MAX HEATING/ COOLING RATE	TOTAL TIME IN CHAMBER	NO. OF REFLOW CYCLES
Pb-Free <sup>1</sup> Soldering	260°C	10s–30s	4°C/s	~ 9 min.	3

**Notes:** 1. If a component is compatible with Pb-free processing temperatures, the floor life recommendation will be listed on the packaging label.

## APPLICATION NOTES FOR SMT DEVICES

Figure 1: Illustration of a Reflow Heating Profile



### Wave Soldering Parameters

Table 2 shows recommended conditions for topside-mounted PCB.

**Note:** Components must never be immersed in molten solder.

Table 2: Wave Soldering Parameters

	MAX PEAK TEMPERATURE	MAX DWELL TIME @ PEAK	MAX HEATING/COOLING RATE
Pb-Free <sup>1</sup> Soldering	260°C	10s–30s	3°C/s

**Notes:** 1. If a component is compatible with Pb-free processing temperatures, the floor life recommendation will be listed on the packaging label. Instructions for soldering

## 1. Solder cream deposition

- 1.1 The substrate must have Pb-free solder protection. Please optically verify that the edges of the zones are clean, without contaminates and that the PCB zoned areas have not oxidated.
- 1.2 Solder cream may be applied on the board with screen printing or dispenser techniques. For either method, the paste solder must be coated to appropriate thickness and shapes to achieve good solder wetting and adequate insulation.

## 2. Placement of the device

- 2.1 SMT components require precise positioning on their soldering pads. Dependin on the frequency range.
- 2.2 Place the device onto the PCB with automatic pick and place equipment. Various types of suction can be used.
- 2.3 Does not recommend using adhesive agents on the component or on the PCB .

## 3. Soldering

- 3.1 Please follow Dorado International's recommended temperature profile.

## 4. Cleaning of the PCB

- 4.1 When using a conventional solder cream with high level of residue, please clean the PCB with a substitute product, similar to CFC, that complies to the International Environment Agency rules. It is important to do the cleaning operation step less than fifteen minutes after reflow.
- 4.2 Recommended using ultrasonic waves or vapor phase process.

## 5. Quality Check

- 5.1 Verify by visual inspection that component is centred on the mounting pads.
- 5.2 Solder joints : verify by visual inspection that the formation of meniscus on the pads and inside the hole are proper, and have a capilarity amount upper the third of the height.

## Element Key

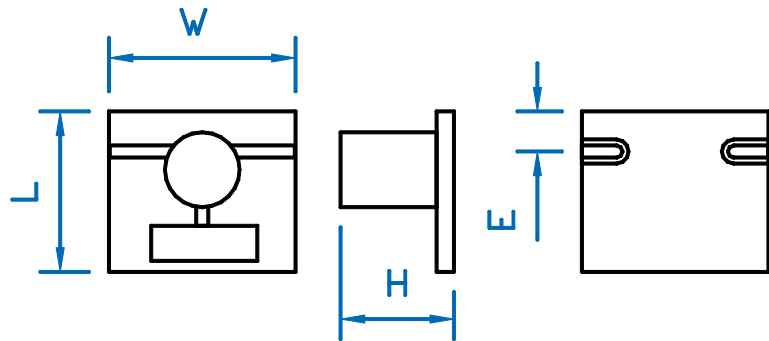
English names from the Periodic Table of elements for symbols used in this document are:

- Sn = tin
- Ag = silver

## SURFACE MOUNT ISOLATORS (5 to 27GHz)

FREQUENCY (GHz)	MODEL NUMBER	BAND WIDTH (%)	INSERTION LOSS (dB)	ISOLATION (dB)	VSWR	PCB PROPERTY		OUTLINE #
						THICKNESS, MM	DK@1MHZ	
5.0 – 5.6	3IMG55-4	5	0.7	16	1.35	0.254	3.9±5%	SM1
5.0 – 5.6	3IMG55-1	full	0.6	20	1.25	0.254	3.9±5%	SM2
21.2 – 23.6	4IMG22-1	full	1	20	1.3	0.125	2.2±5%	SM3
25.27 – 27.0	4IMG26-1	full	1.3	19	1.32	0.125	2.2±5%	SM4

OUTLINE #	DIMENSIONS, mm			
	W	L	H (max)	E
SM1	12.0	12.0	1.8	3.00
SM2	12.0	12.0	4.0	3.00
SM3	6.0	6.0	4.0	1.50
SM4	5.0	7.0	4.0	1.35



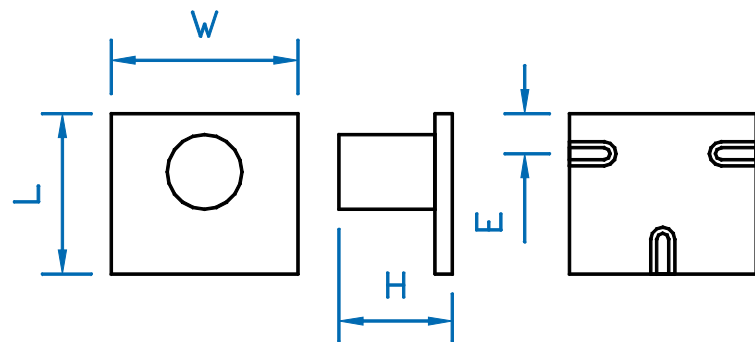
**NOTES:**

1. MODIFIED VERSIONS OF ALL DEVICES ARE AVAILABLE
2. LOAD POWER UP TO 1W

## SURFACE MOUNT CIRCULATORS (8.5 to 27GHz)

FREQUENCY (GHz)	MODEL NUMBER	BAND WIDTH (%)	INSERTION LOSS (dB)	ISOLATION (dB)	VSWR	PCB PROPERTY		OUTLINE #
						THICKNESS, MM	DK@1MHZ	
8.5 – 10.5	4CMG(xx)-2	10	0.6	20	1.25	0.254	3.9±5%	SM5
21.2 – 23.6	4CMG22-1	full	1.1	18	1.3	0.125	2.2±5%	SM6
25.0-27.0	4CMG26-1	full	1.1	18	1.3	0.125	2.2±5%	SM7

OUTLINE #	DIMENSIONS, mm			
	W	L	H (max)	E
SM5	12.0	12.0	4.0	2.5
SM6	6.0	6.0	3.5	1.5
SM7	4.0	4.0	3.0	1.2



**NOTES:**

1. MODIFIED VERSIONS OF ALL DEVICES ARE AVAILABLE
2. (xx) IDENTIFIES THE CENTER FREQUENCY OF THE DEVICE IN G