

Product Tape and Reel, Solderability & Package Outline Specification

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1. General Information

This specification covers MicroLeadFrame (MLF | Quad flatpack no leads (QFN's) and DFN (Dual Flat No-Lead) SMT IC packages with soldered electrical connections made to the surface of the connecting PCB, shipped in Tape and Reel.

The QFN has leads on all four sides with the DFN having leads on two sides of the package. QFN and DFN packages have full leads exposed to the edge of the package. The exposed edge of the lead is not plated and a solder fillet is not necessary for proper mounting.

Lead finish for the QFN package is Matte Sn with the lead finish for the DFN packages Ni plated.

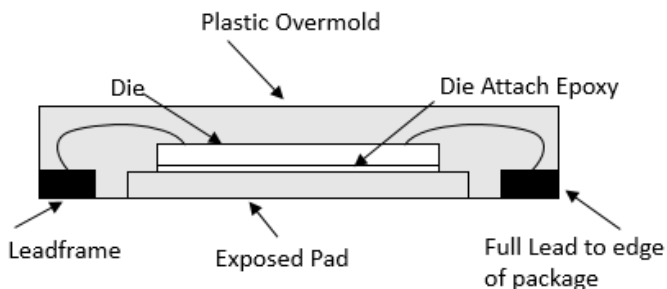


Figure 1
Cross Section View of a QFN/DFN Package

Cross Section View of a QFN/DFN Package with Full Leads

The packages noted are easily mounted using standard PCB SMT reflow assembly techniques and can be removed and replaced using standard removal techniques. This manufacturing note presents users with general information on how the devices are packaged on tape and reels and how to solder the component to PCB's.

All packages listed in this specification are RoHS compliant lead-free packages.

2. Tape and Reel

Guerrilla RF's Tape and Reel specification is in compliance with Electronics Industries Association (EIA) standards for "Embossed Carrier Tape of Surface Mount Components for Automatic Handling". Reference EIA-481. See Table 1 for Tape and Reel specifications along with units per reel.

Devices are loaded with pins down into the carrier pocket with protective cover tape, wound onto a plastic reel. Each reel will be packaged in a cardboard box. There will be product labels on the reel, the protective ESD bag and the outside of the box.

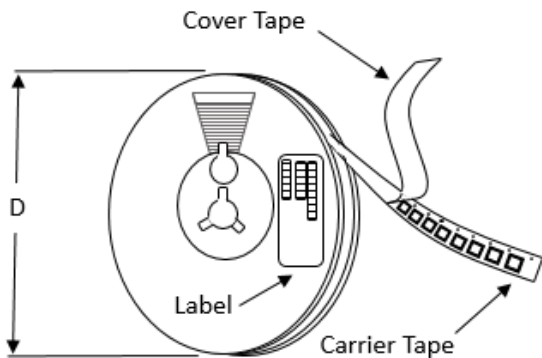


Figure 2
Tape and Reel Packaging with Reel Diameter Noted (D).

Tape and Reel Packaging

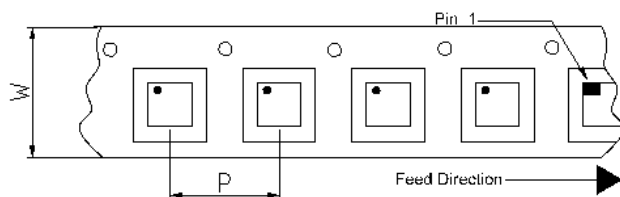


Figure 3
Carrier Tape, Pitch (P), and Feed Direction Noted for QFN/DFN

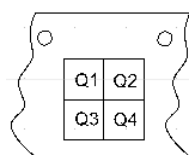


Figure 4
Pin 1 Quadrant Information

Table 1 Tape and Reel Specification and Units per Reel

Package Style Code	Nominal Package Size			Carrier Tape Dimensions			Reel Diameter	Units Per Reel
	Type	Width/Size mm	Leads	Width W mm	Pocket Pitch P mm	Pin 1 Quadrant	D Inches	Qty
A	QFN	2x2x.5	12	8	4	Q1	7"	2500
B	QFN	3x3x.85	16	12	8	Q1	7"	1500
C	DFN	1.5x1.5x.45	6	8	4	Q1	7"	2500
D	DFN	2x2x.75	8	8	4	Q1	7"	2500

3. Package Outline Drawing

Package Outline Drawings are provided as a general reference only. Please reference product Gerber files to assist in PCB layout. Files are available at www.guerrilla-rf.com/products for each part number.

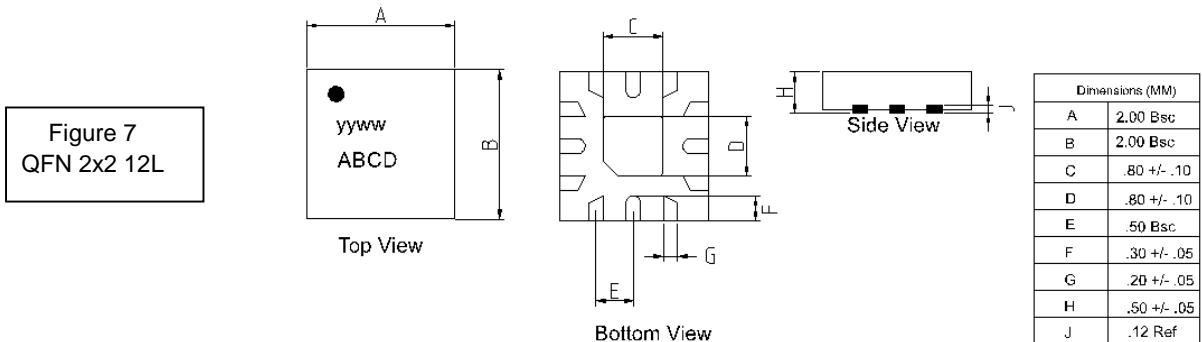


Figure 5
QFN 3x3 16L

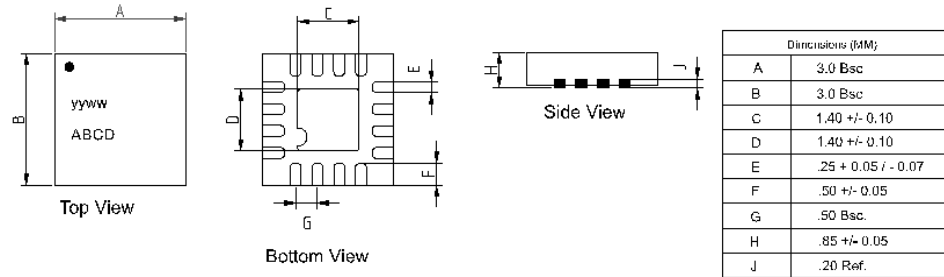


Figure 6
DFN 1.5x1.5 6L

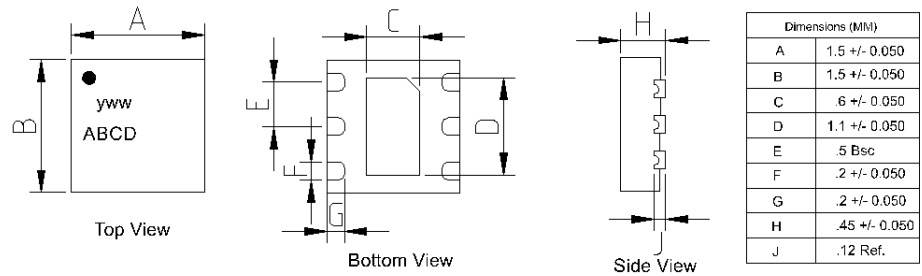
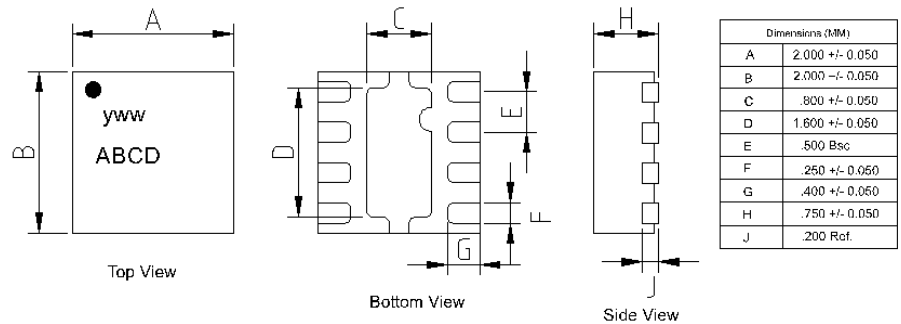


Figure 7
DFN 2x2 8L



4. ESD

Guerrilla RF qualifies devices to **ANSI/ESDA/JEDEC JS-001-2014 and ANSI/ESDA/JEDEC JS-002-2014**. Devices are ESD sensitive and should be handled accordingly. Individual device ratings can be found on Product Data Sheets. JEDEC JESD625B is a common reference for review.

5. Moisture Sensitivity Level

Guerrilla RF qualifies devices to JEDEC J-STD-020. Please reference shipping bag and reel label for device MSL and Peak Reflow Ratings. Please reference JEDEC J-STD-033 for Handling of moisture sensitive devices.

6. PCB Design Guidelines - Land Pattern and Stencil Design

Manufacturing Note MN-001 – Product Tape and Reel and Solder Reflow Specification

For Volume Production, devices can be treated as a standard surface mount component (ref IPC/JEDEC J-STD-020) with a standard assembly process. (Stencil solder printing, standard pick & place & solder reflow oven).

PCB design considerations are needed to properly design the PCB and solder stencil to mount the package. Recommended land pattern/gerber files are available to assist in PCB design. Guerrilla RF gerber files can be downloaded at www.guerrilla-rf.com at the bottom of each product landing page.

7. Solder Paste

There are no special requirements necessary when reflowing components. A low residue, no-clean solder (SN63/Pb37 or SAC alloy) paste is commonly used. The solder-paste manufacturer's printing and temperature profile should be used to optimize the assembly process.

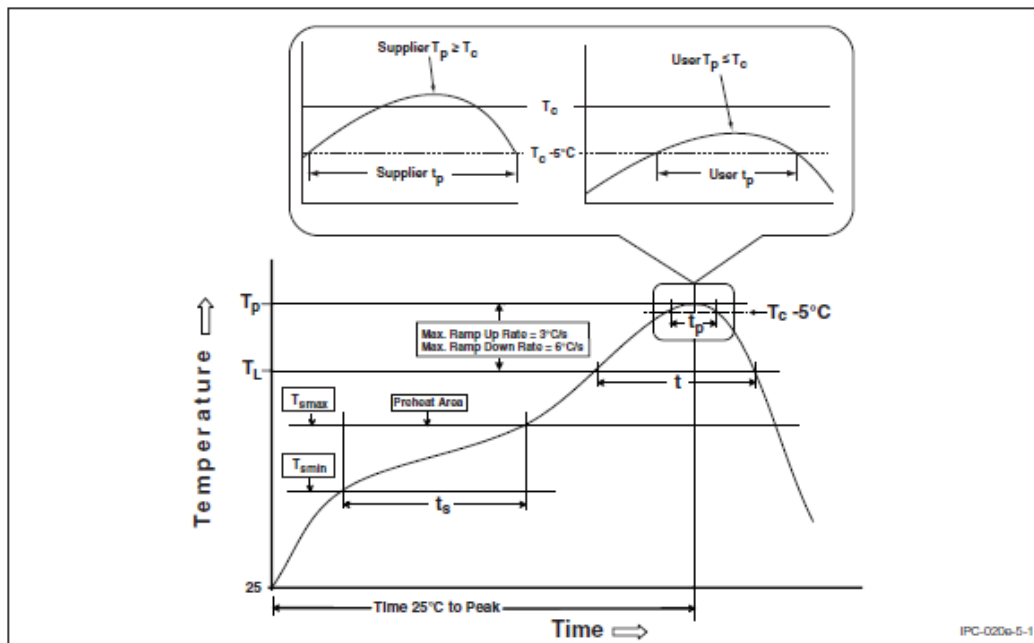
To verify any open or short circuits (bridging) after reflow, optical inspection and x-ray inspection are typical techniques that may be used.

8. Reflow Profile

A typical reflow profile is shown in Figure 10 as a reference only. The actual profile parameters depend upon the solder paste used, therefore, recommendations from paste manufacturers should be followed for reflow profile and any post solder cleaning.

Guerrilla RF has tested and qualified the packages listed in Table 1 for three (3x) reflow operations per JEDEC JSTD-020. This allows one reflow operation per side of the PCB (assuming the use of a double-sided PCB) and one rework operation if necessary.

Manual or hand soldering is not recommended but if necessary the same temperature profile as the normal reflow soldering should be used. The peak temperature must not exceed the standard assembly reflow process.



Manufacturing Note MN-001 – Product Tape and Reel and Solder Reflow Specification

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Min (T_{min})	100 °C	150 °C
Temperature Max (T_{max})	150 °C	200 °C
Time (t_p) from (T_{min} to T_{max})	60-120 seconds	60-120 seconds
Ramp-up rate (T_L to T_p)	3 °C/second max.	3 °C/second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time (t_L) maintained above T_L	60-150 seconds	60-150 seconds
Peak package body temperature (T_p)	For users T_p must not exceed the Classification temp in Table 4-1. For suppliers T_p must equal or exceed the Classification temp in Table 4-1.	For users T_p must not exceed the Classification temp in Table 4-2. For suppliers T_p must equal or exceed the Classification temp in Table 4-2.
Time (t_p)* within 5 °C of the specified classification temperature (T_c), see Figure 5-1.	20* seconds	30* seconds
Ramp-down rate (T_p to T_L)	6 °C/second max.	6 °C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Figure 8 Typical Reflow Profile provided as reference only. Please reference J-STD-020.

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Appendix A: Revision History

Revision	Date Reason for Revision
Revision A	4-25-2016 Initial Release
Revision B	10-13-2016 Added package tolerances, corrected typos.
Revision C	11-21-2016 Removed SOT89 reference, updated 3x3 QFN reel size from 1000 to 1500 and added QFN and DFN Lead Finish note.