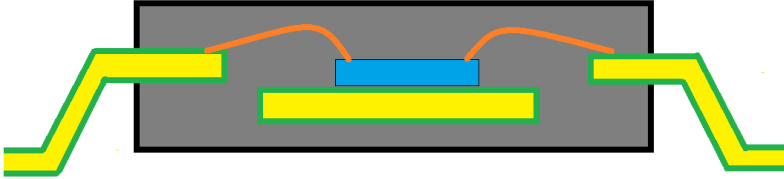
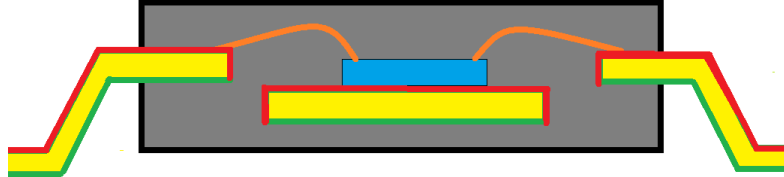
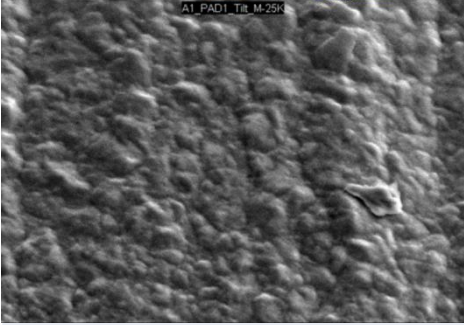
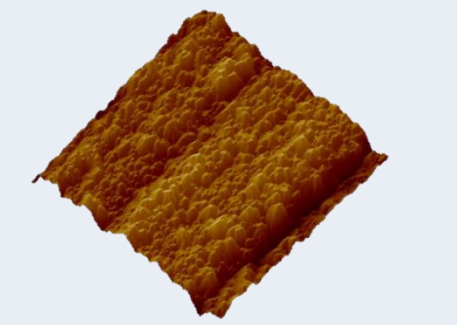
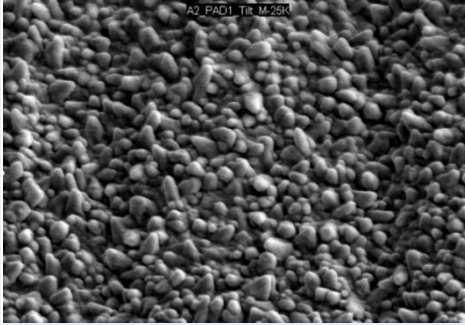
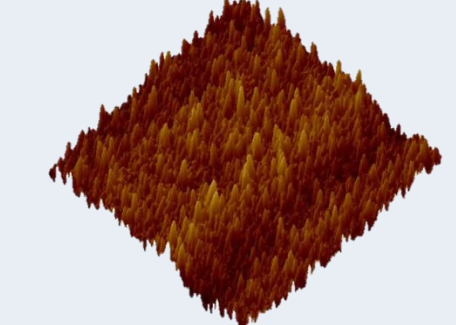


Single Side Rough Leadframe

- Texas Instruments has introduced Rough Leadframe Technology to enhance the mechanical stability of the package.
- The purpose of this document is to:
 - Explain the physical appearance of the single side rough surface finish
 - Show examples of automated optical inspection (AOI) differences
 - Indicate no surface mount technology (SMT) soldering impact

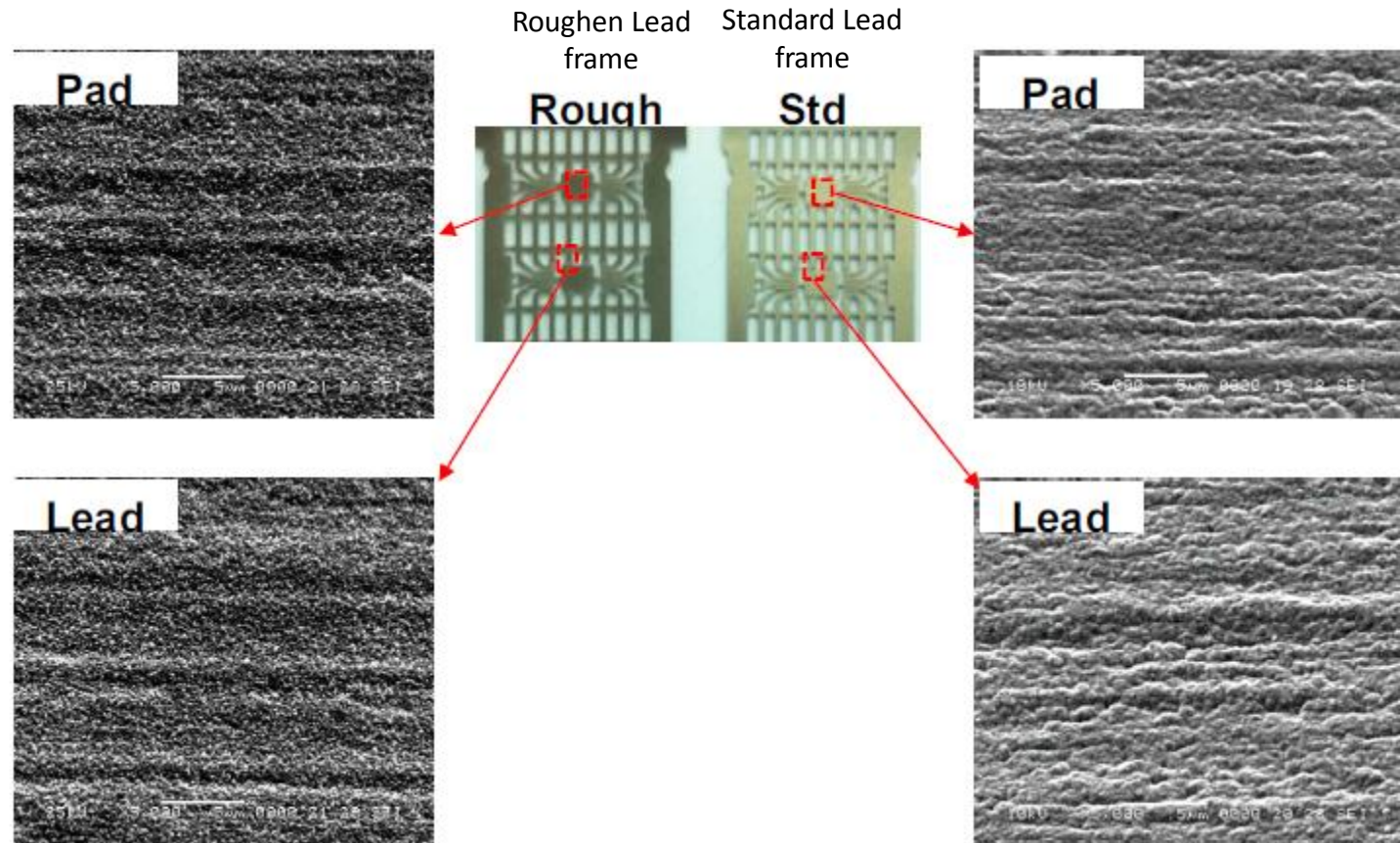
Non-Rough Pre-plated Leadframe Base Cu non- rough NiPdAu finish	
Rough Pre-plated Leadframe Base Cu non- rough NiPdAu finish Rough NiPdAu finish	

Non-Rough vs Rough Leadframe Surface

Non Roughen Leadframe (Standard lead frame)		Roughen Leadframe	
SEM @25Kx	AFM	SEM @25Kx	AFM
			

- The Roughening is created during the Leadframe manufacturing process and is confirmed by the Leadframe vendor using SEM and atomic force microscopy (AFM).
- The pre-plated finish on non-rough and rough Leadframes are identical NiPdAu.
- Roughening significantly increases the amount of contact area between the Leadframe surface and the package mold material, enhancing the interfacial strength.

LF characterization - LF surface comparison



x5000 SEM

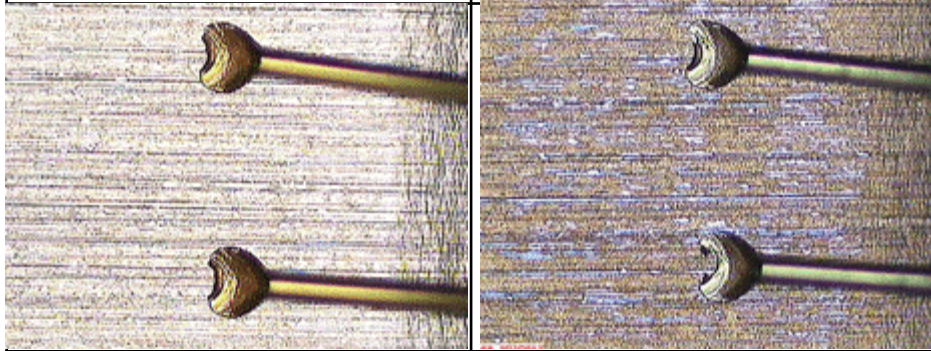
Sumitomo RT LF provides uniform rough surface and enhances mechanical force between metal and epoxy.

Standard Lead frame

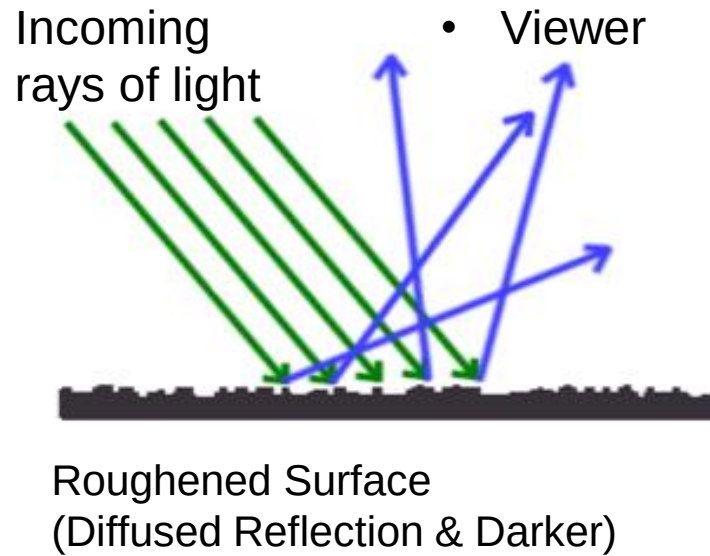
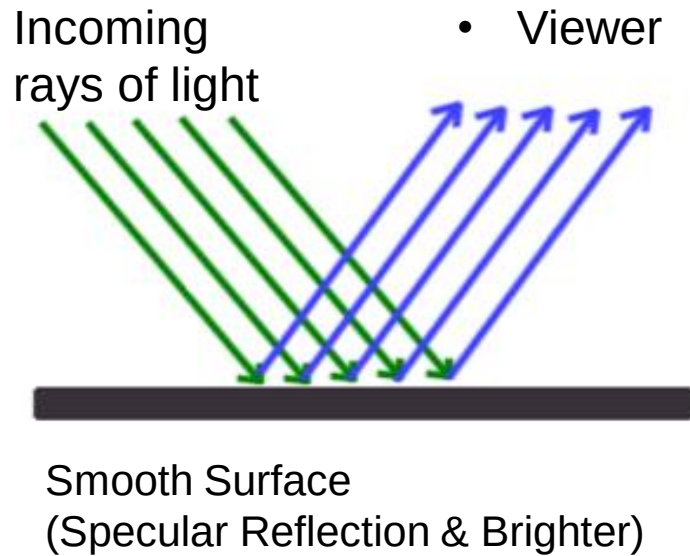
Roughen Lead frame

Std L/F

RLF



Rough Leadframe Darker Appearance

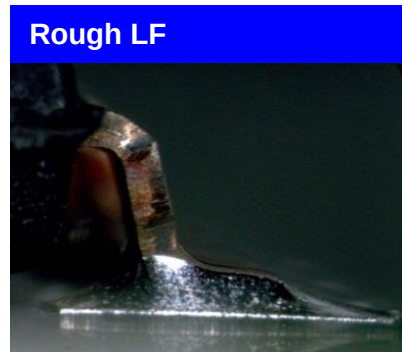


- The non-Rough Leadframe's relatively smooth surface has a brighter appearance due to the predominant specular reflection.
- The Rough Leadframe's textured surface has a darker appearance due to the increased amount of diffused reflection.

SMT Soldering Assessments

- No changes are required in either the PCB level assembly process flow or equipment settings for the Rough Leadframe.

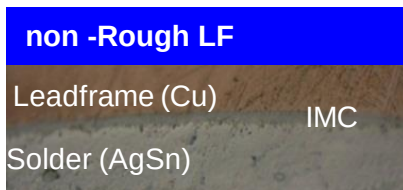
Solder wicking comparison



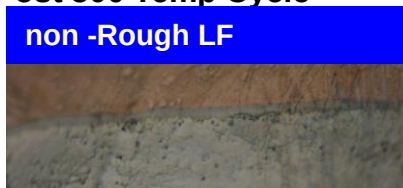
- No difference in solder wicking between non-rough and rough
- Meets IPC-A-610-E and JEDEC 22-B102E criteria

IMC comparison

Initial as soldered



Post 500 Temp Cycle



- No difference in IMC formation between non-rough and rough
- No change to solder joint reliability