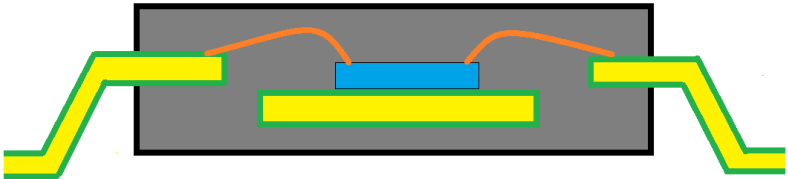
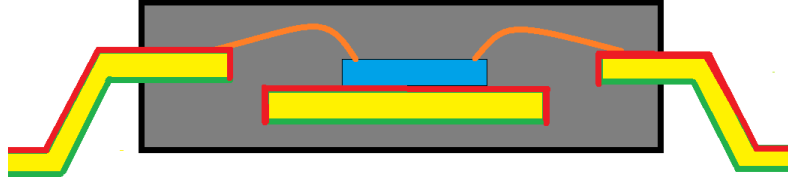


# Application Note

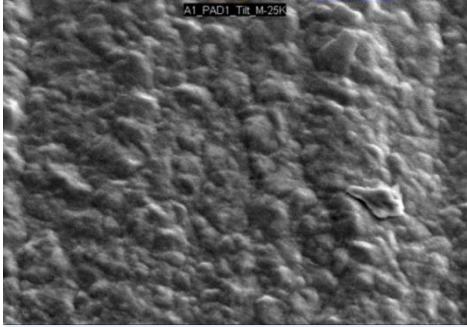
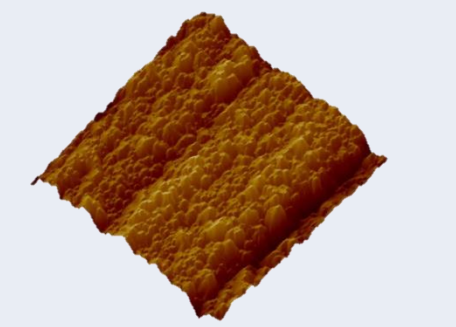
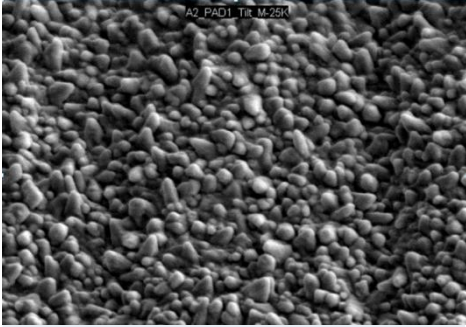
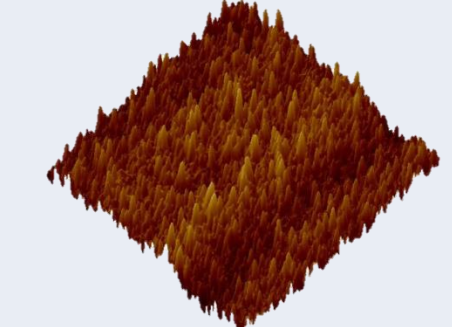
## Single Side Rough Leadframe

# 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

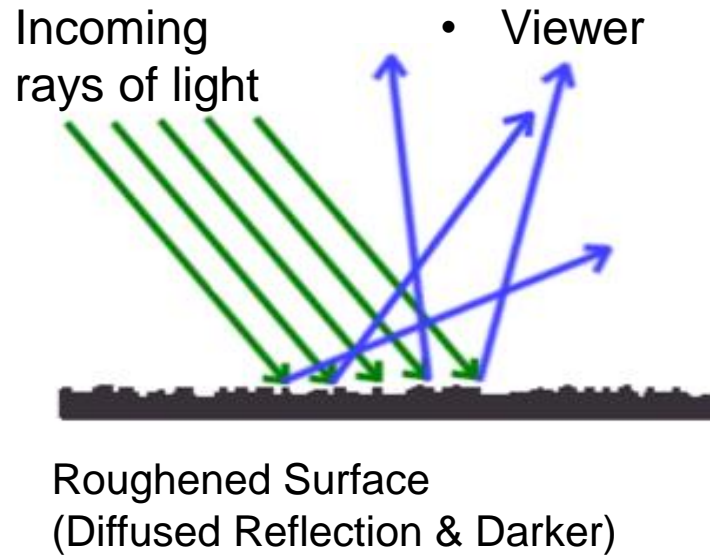
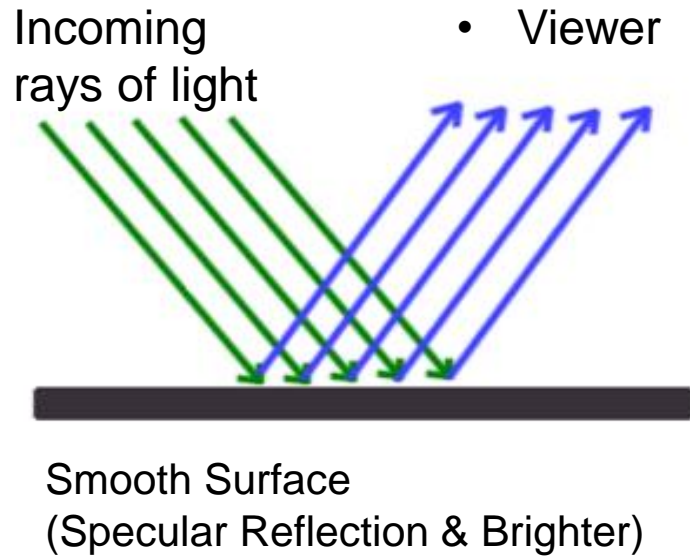
<p><b>Non-Rough Pre-plated Leadframe</b> Base Cu non- rough NiPdAu finish</p>	
<p><b>Rough Pre-plated Leadframe</b> Base Cu non- rough NiPdAu finish Rough NiPdAu finish</p>	

# Non-Rough vs Rough Leadframe Surface

Non Roughen Leadframe		Roughen Leadframe	
SEM @25Kx	AFM	SEM @25Kx	AFM
			

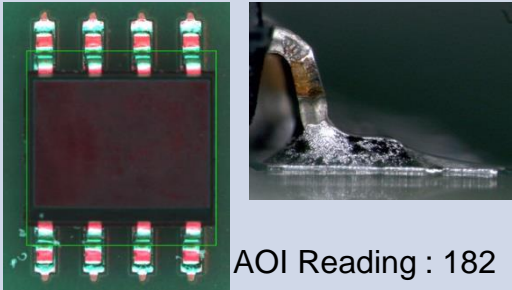
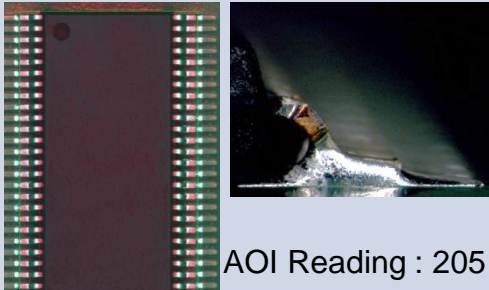
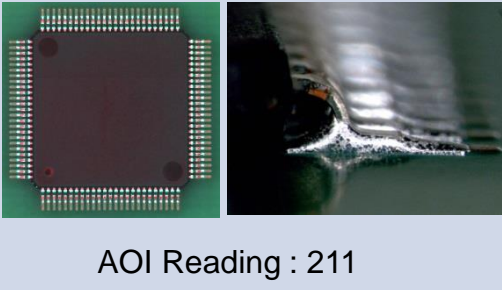
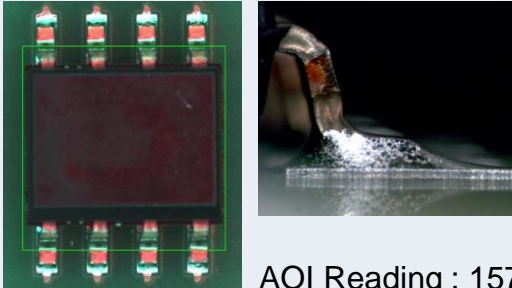
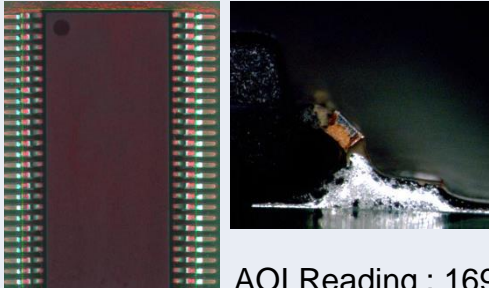
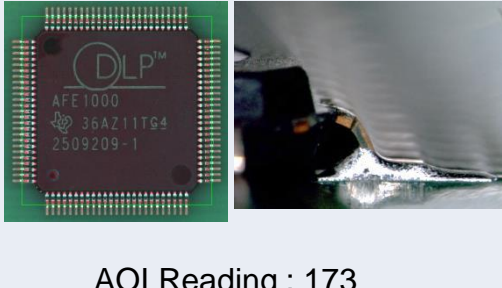
- The Roughening is created during the Leadframe manufacturing process and is confirmed by the Leadframe vendor using SEM and atomic force microscopy (AFM).
- The pre-plated finish on non-rough and rough Leadframes are identical NiPdAu.
- Roughening significantly increases the amount of contact area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

# 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.

# Automatic Optical Inspection (AOI)

Package	SOIC	TSSOP	QFP
Non-Rough Leadframe	 <p>AOI Reading : 182</p>	 <p>AOI Reading : 205</p>	 <p>AOI Reading : 211</p>
Roughen Leadframe	 <p>AOI Reading : 157</p>	 <p>AOI Reading : 169</p>	 <p>AOI Reading : 173</p>

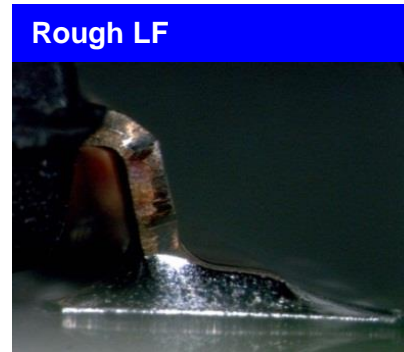
AOI scale is from 0~255

- **The Rough Leadframe's diffused light reflection is confirmed by the AOI lower brightness reading.**
- **Actual readings will vary dependent on the AOI tool and light settings.**

# 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



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

### Post 500 Temp Cycle

