Arrow Single LiDAR TOF Solution

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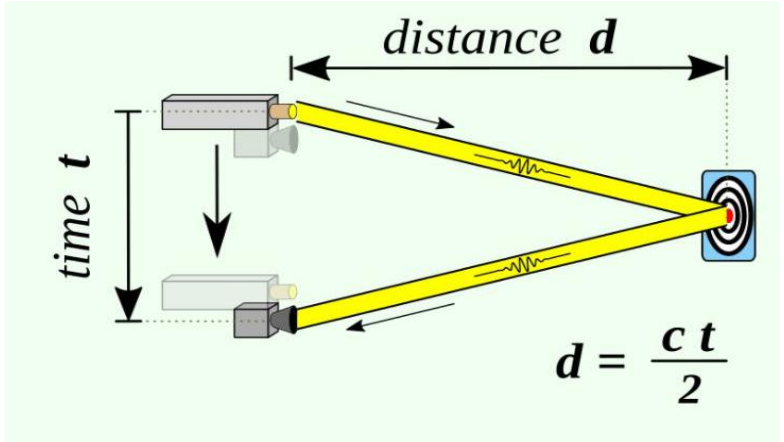
Arrow Single LiDAR TOF Solution Introduction

- LiDAR (Light Detection and Ranging) is using ToF (Time of Flight) as a core technology for measuring time spent from sensor to object and reflect to sensor and thus for distance estimation between sensor and object.
- Arrow LiDAR ToF solution are composed of 75W Laser diode (LD) and highly sensitive Photomultiplier together with high bandwidth, low delay optical front-end system to provide accurate ToF timing measurement through TDC (Time-to-Digital Converter) and then convert to the distance information.
- A short pulse on Laser diode (< 15nsec) can give a good Laser optical power output with smaller input power thru Fast eGaN FET transistor and Gate driver control.
- Operation range: 50cm – 50m (Indoor environment)
- 3 operated mode is supported, Average, Continuous and one-shot mode.



$$d = \frac{c \times t}{2} \quad (1)$$

c – speed of light

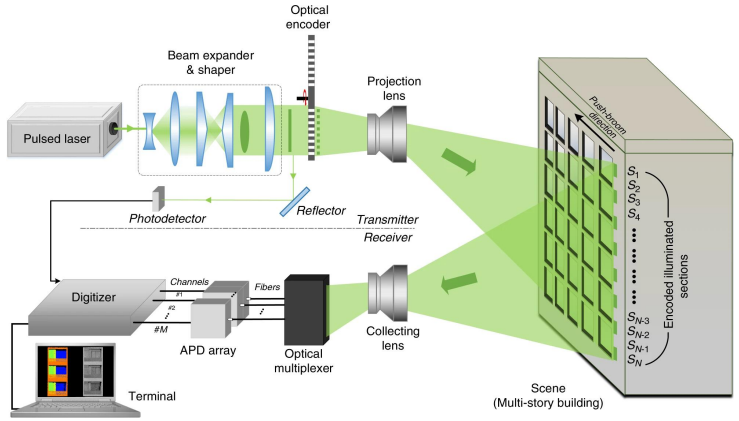
t – ToF measured time

d – distance between object

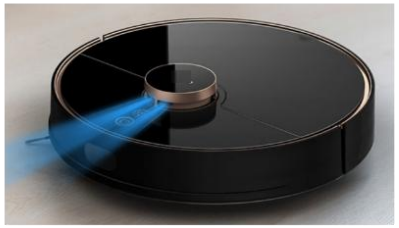
Basic principle for Pulsed LiDAR ToF system

LiDAR Use Marketing

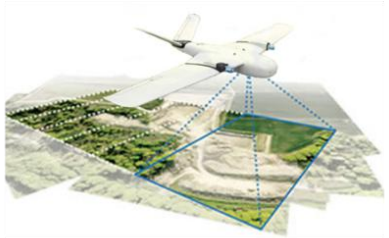
- Distance and range measurement
- Speed measurement
- Car parking assistant system
- Machine Vision
- Security system
- Create 3D map



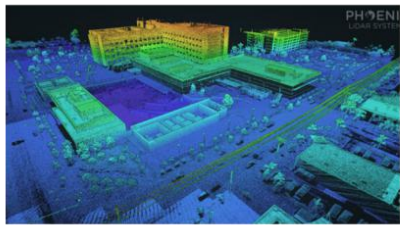
Automated Guided Vehicles



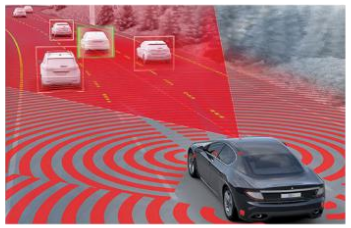
Lidar Robotic Vacuum



Drone Navigation and 3-D Mapping

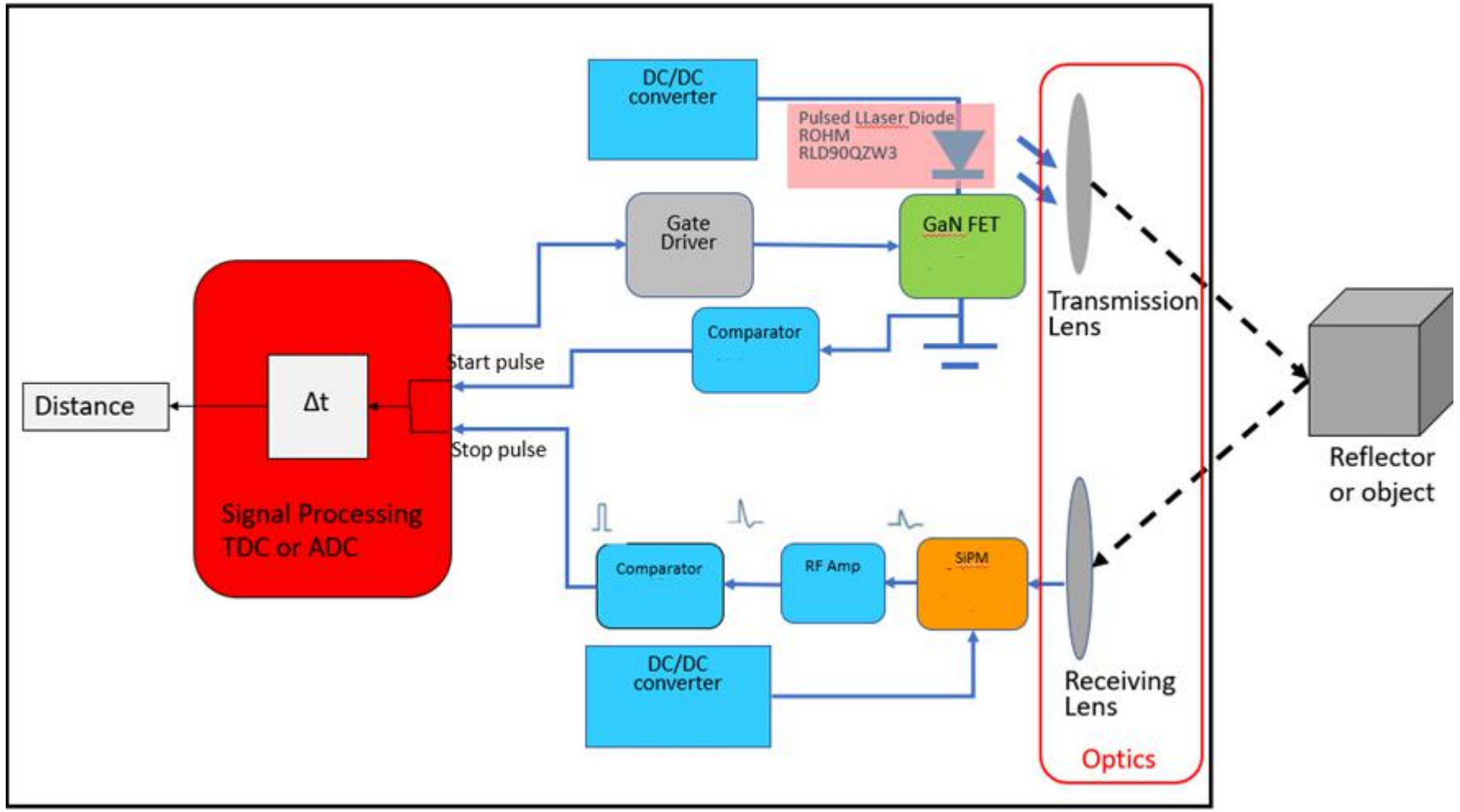


Lidar Surveillance Systems



Autonomous Vehicle Navigation

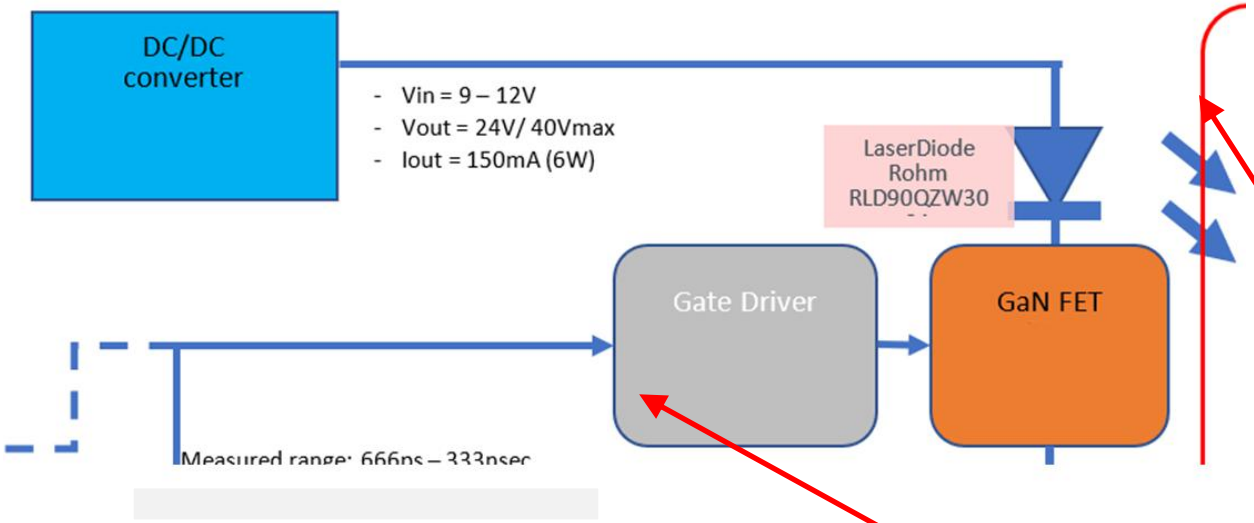
Arrow Single LiDAR ToF solution Block Diagram

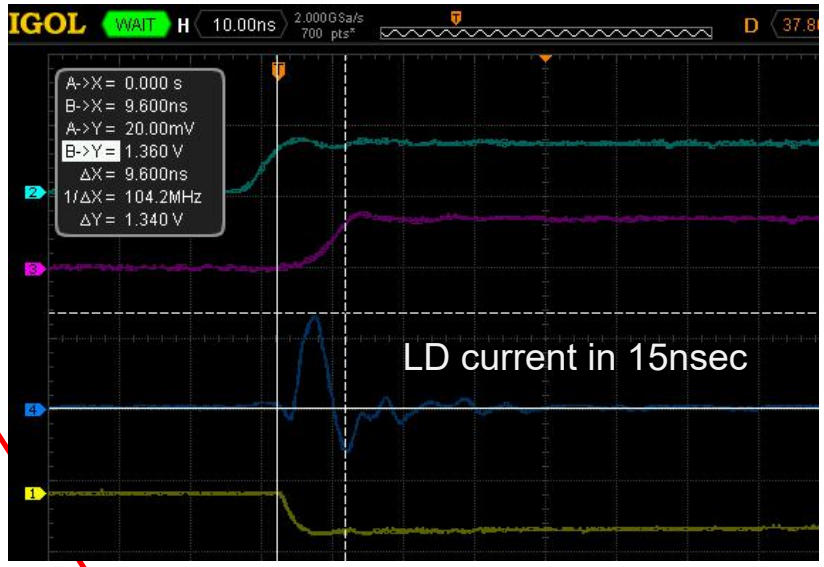


Arrow Single LiDAR TOF Solution – Transmit Path

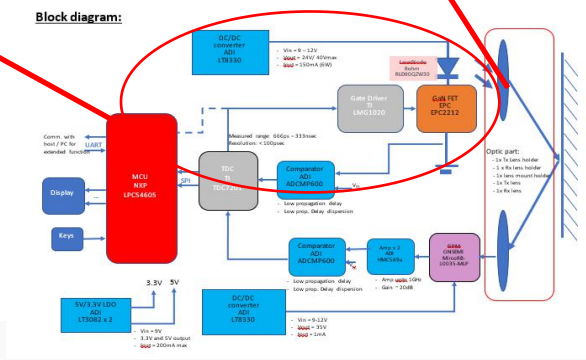
- Adjustable Vout from 25V – 60V for higher LD power

- LD can give higher optical power with the shorter pulse width
- 15nsec pulse width is used in Arrow demo





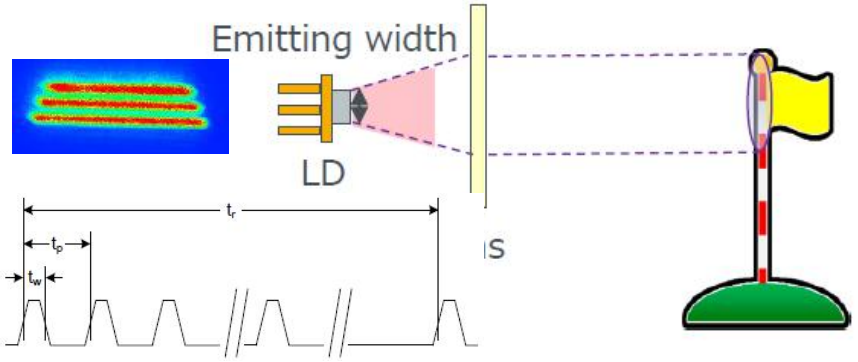
- MCU generate a triggering pulse to Gate driver
- Gate driver generate a short trigger pulse in 15ns or less
- eGaN FET provides fast switching behavior for LD
- PCB layout is also important to achieve fast switching, especially for the grounding for difference power supply system



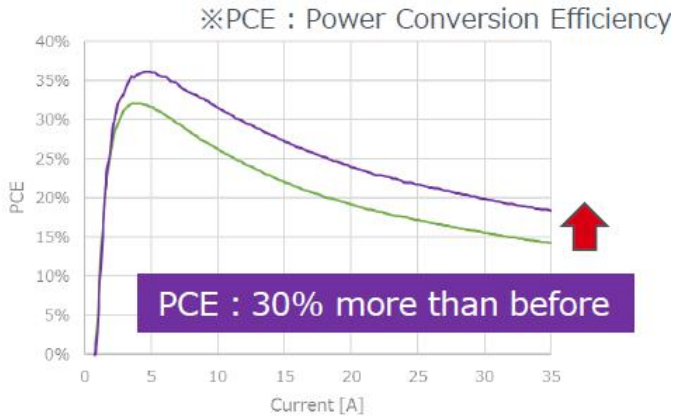
Arrow Single LiDAR TOF Solution– LD ROHM RLD90QZW3

Key features of ROHM RLD90QZW3

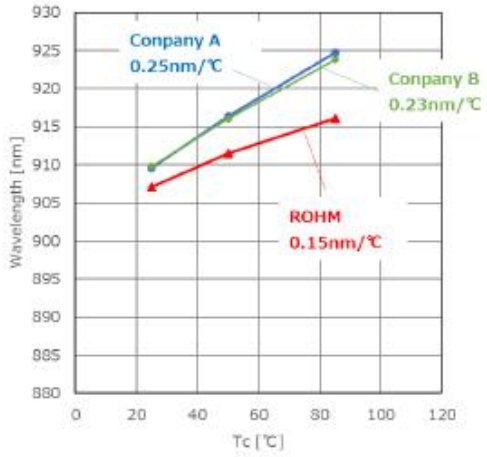
Narrow emitting width→
Longer distance and higher accuracy



High PCE (Power Conversion Efficiency) →
Higher reliability and energy saving



Smaller temp variation in waveform →
Energy saving and longer distance



Support narrowing trigger pulse width→
Higher optical power, longer distance, power saving

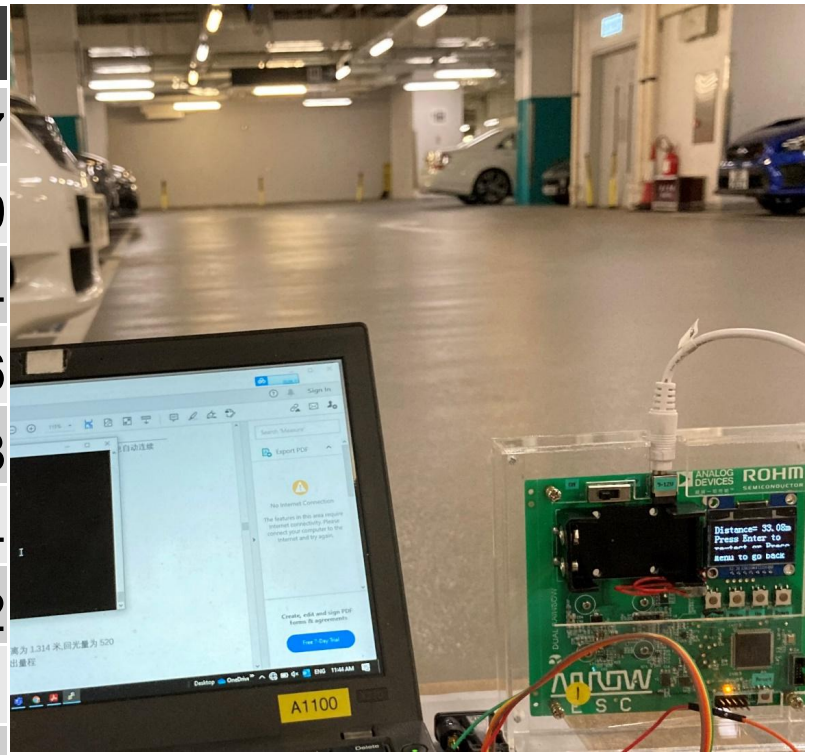
		Emitting Area	Maximum Ratings	Absolute Maximum Ratings (plans)		
			PW:50ns	PW:50ns	PW:15ns	PW:5ns
RLD90QZW3	Vf Improved Version	225 μm	75W	90W	130W	140W

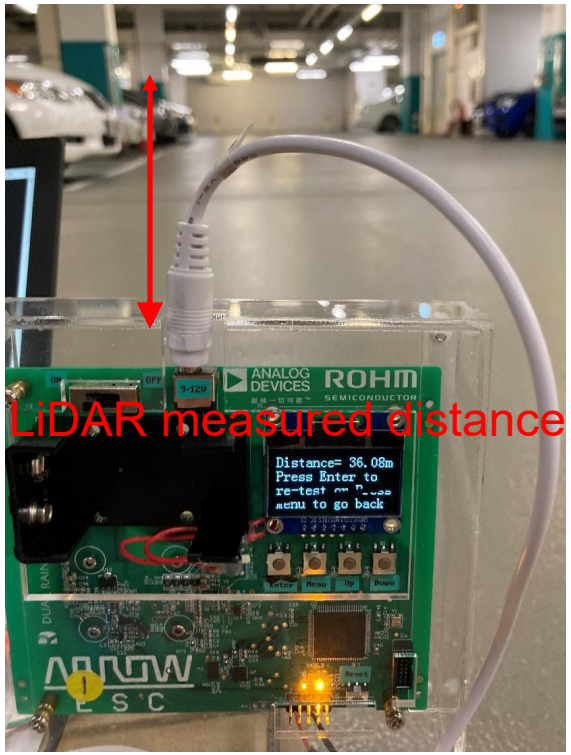
Test Result

Distance Test Result

- check on the measurement distance vs the actual distance in indoor environment condition

Distance/m	LiDAR Measure Distance/m
0.5	0.47
0.7	0.69
0.9	0.94
5	5.06
10	10.08
15	15.04
20	20.02
30	30.01
40	39.98
50	49.99





Thank You