

## Lightwave Receiver Data Sheet

# **FRS15Z221AW/652**

### APPLICATIONS

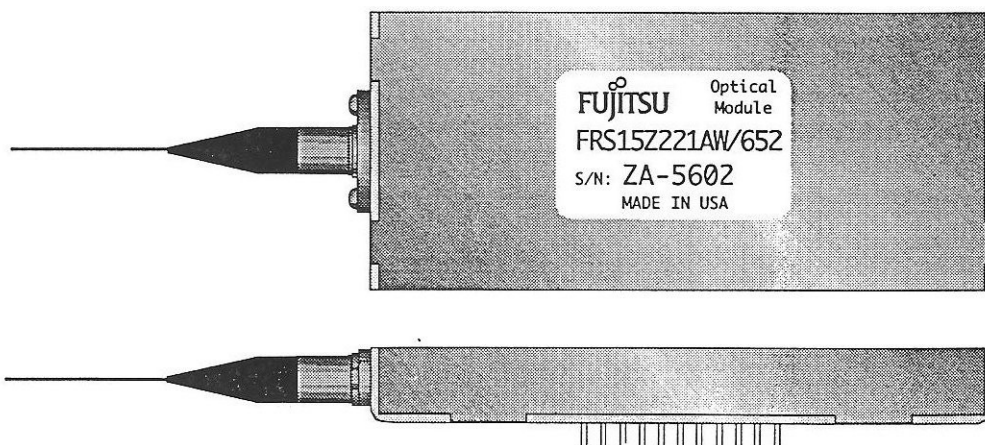
- SONET OC-3 and SDH STM-1 Systems
- Data Link
- Fiber In The Loop
- Passive Optical Network

### FEATURES

- Built-in Clock Recovery Circuit
- InGaAs PIN
- Wide Dynamic Range
- Good Sensitivity
- $\pm 5$  Volt Power Supply
- Alarm Function
- Available Options
  - 2R Operation
  - 40 to +85°C Operating Temperature

### BENEFITS

- Facilitates System Design
- 1550 nm Operation
- Short and Long Haul Applicable
- Long Transmission Span
- Facilitates Circuit Design
- System Performance Monitor



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Lightwave Receiver

## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Unit
Storage Temperature	T <sub>stg</sub>	-10 to +70	°C
Storage Temperature (1day only)	T <sub>stg</sub>	-40 to +70	°C
Operating Temperature	T <sub>op</sub>	0 to +70	°C
Supply Voltage	V <sub>ee</sub>	-6	V
	V <sub>cc</sub>	+6	V
Lead Soldering Temperature		250	°C
Lead Soldering Time		5	s
Soldering Method	Soldering Iron Only. No flow or dip soldering		

## ELECTRICAL CHARACTERISTICS (T<sub>op</sub> = 0 to 70°C)

Parameter	Symbol	Rating			Unit
		Min.	Typ.	Max.	
DC Power Consumption		-	1.8	2.0	W
DC Power Voltage	V <sub>ee</sub>	-5.46	-5.2	-4.75	V
	V <sub>cc</sub>	4.75	5.0	5.25	V
Clock/Data Signal Level	(Note1)	ECL 10KH Compatible			
Data and Clock Relationship		-	-	±0.5	ns
Signal Alarm	(Note 2)	ECL Compatible			
Timing Jitter (rms)		-	-	0.01	UI
Clock Duty Cycle (fo=100%)		40	50	60	%

Note 1: With 50 ohm loads to -2.0V

Note 2: Internal load to -5.2V

## OPTICAL CHARACTERISTICS (T<sub>op</sub> = 0 to 70°C, 2<sup>23</sup> -1 PRBS NRZ) (Note 3)

Parameter	Test Conditions	Rating			Unit
		Min†.	Typ.	Max.	
Sensitivity	$\lambda = 1550 \text{ nm}, 10^{-10} \text{ BER}$	-38	-	-	dBm
Overload		-8	-	-	dBm

Note 3: Measured at R point in accordance with CCITT G.957

†: At 25°C, beginning of life.

### **APPLICATION NOTES**

Good RF layout should be observed for optimum performance:

- a) Good grounding of the package is essential. The use of a low impedance ground plane is recommended.
- b) All power lines should be decoupled to ground near the receiver package. We recommend, as a minimum, 1nF NPO chip capacitors close to the power pins, and 4.7uF tantalum capacitors on the power nets, close to the Vee1 and Vcc1 pins, as shown in the figure.
- c) The output data, complementary data, and clock signal should be terminated with a 50 ohm load to -2V, using proper transmission line techniques.

### **ALARM (logic "1" indicates "Alarm")**

The LOS alarm output is ECL Voltage level compatible without the addition of an external pull down resistor.

Function	Condition For Activation		Symbol	Pin
Signal Alarm	Activation:	Decreasing power, threshold of P -1 to P -6 dB where P is the power corresponding to a BER of $10^{-3}$	LOS	5
	Activation Time:	50 us max. at 25°C, 55 us max. 0-70°C.		
	Deactivation:	Increasing power, hysteresis 0.5 dB min., 3.0 dB max. Alarm will be deactivated before P is reached.		
	Deactivation Time:	< 500 us, for P < -16 dBm < 10 ms, for -15 < P < -8 dBm *		

\* Due to AGC loop condition

### **HANDLING PRECAUTIONS**

This device is susceptible to damage as a result of Electrostatic Discharge (ESD). Appropriate handling precautions against Electrostatic Discharge Damage must be taken during both handling and testing.

This device should not be handled by the optical fiber but by the body.

### **MOUNTING AND CONNECTIONS**

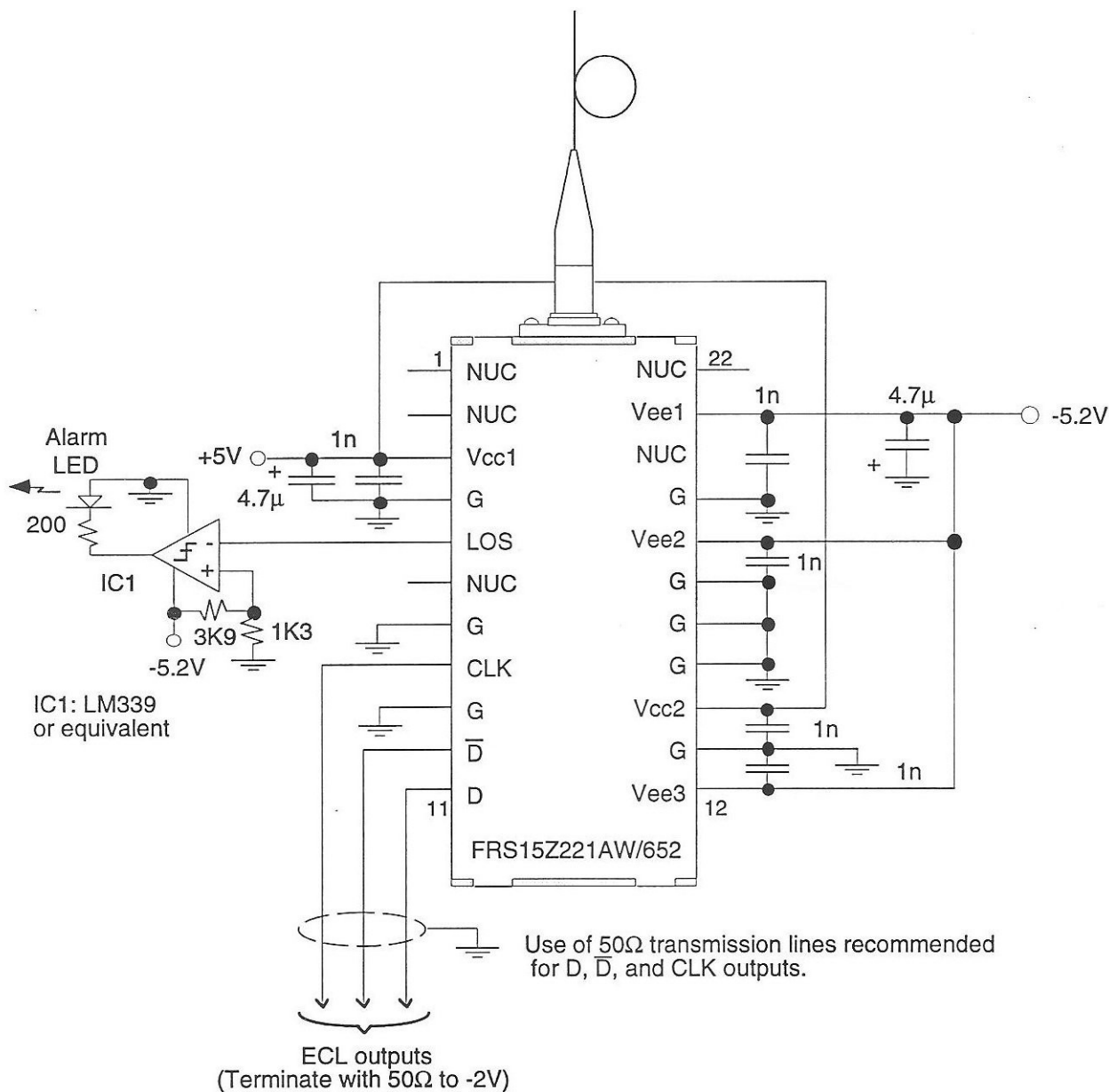
Care must be taken to avoid heating the module beyond the Absolute Maximum Ratings when soldering. Flow or dip soldering methods should NOT be used in the assembly process for this device.

### **FIBER SPECIFICATION**

Optical Fiber	50/125um MMF	
Fiber Length	600 ± 25, 800 ± 25, 950 ± 25 or 1300 ± 25	mm
Fiber Tensile Strength	10N/10S	
Fiber Bending Radius	40	mm
OPTION F: Optical Connector	Seiko FC/PC or Equivalent	FRS15Z221AWF/652

## Lightwave Receiver

## A TYPICAL TEST CIRCUIT

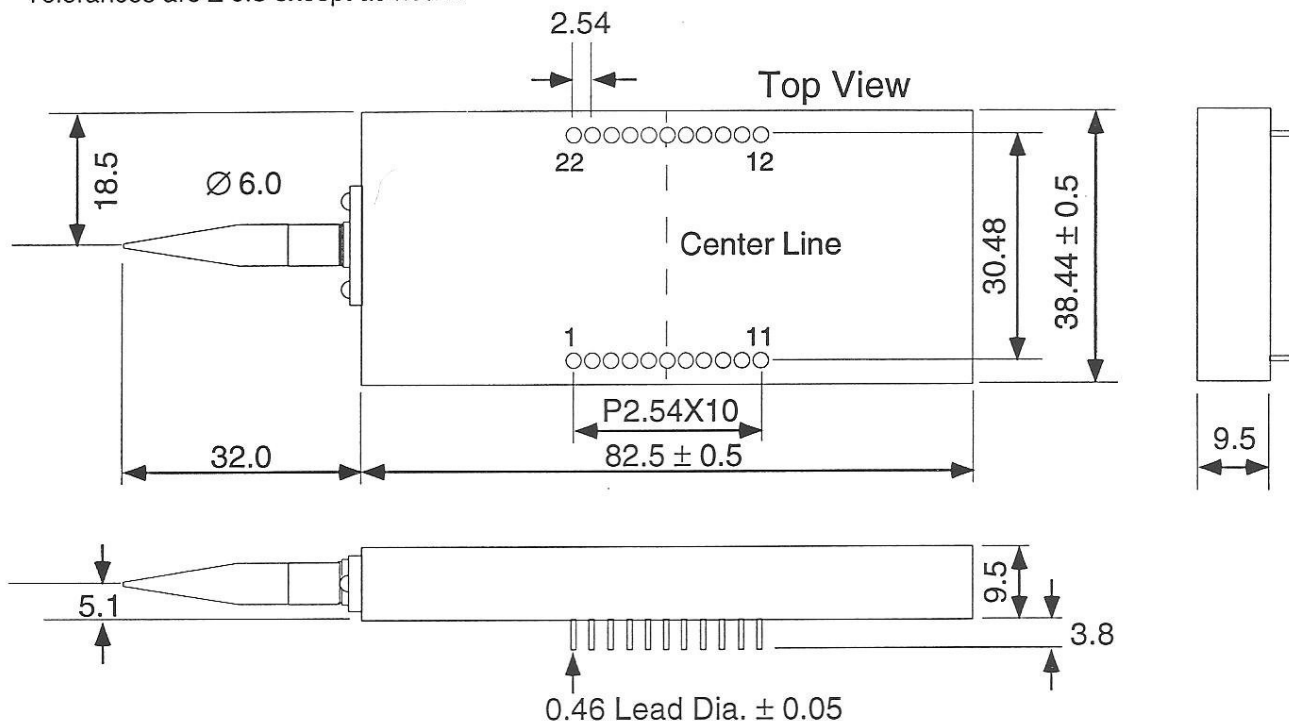


**NOTE:** For best performance, good grounding of the module is important.  
Use of a low impedance ground plane is recommended.  
All the 1nF decoupling capacitors should be NPO dielectric.  
Decouple all Vee and Vcc to ground near the package.

### Lightwave Receiver

### PACKAGE OUTLINE (mm)

Tolerances are  $\pm 0.3$  except as noted.



## PIN ASSIGNMENT

Pin	Symbol	Function	Pin	Symbol	Function
1	NUC	No User Connection	12	Vee3	-5.2 Volts*
2	NUC	No User Connection	13	G	Ground
3	Vcc1	+5 Volts*	14	Vcc2	+5 Volts*
4	G	Ground	15	G	Ground
5	LOS	Loss of Signal Alarm Voltage Levels ECL Compatible	16	G	Ground
6	NUC	No User Connection	17	G	Ground
7	G	Ground	18	Vee2	-5.2 Volts*
8	CLK	Clock Out ECL 10KH Compatible	19	G	Ground
9	G	Ground	20	NUC	No User Connection
10	$\overline{D}$	$\overline{\text{Data Out ECL 10KH}}$ Compatible	21	Vee1	-5.2 Volts*
11	D	Data Out ECL 10KH Compatible	22	NUC	No User Connection

\* Decouple to ground near the package

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*Lightwave Receiver*

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