



# AMT121302

1.25 Gb/s 1310/1550nm PIN – TIA

Data Sheet - Rev 1

## FEATURES

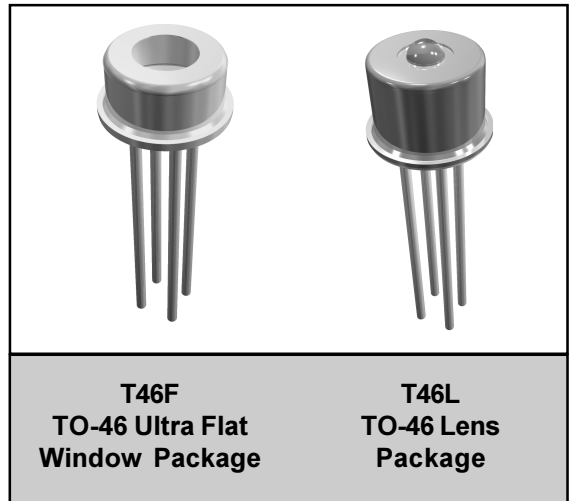
- 1.25 Gb/s Differential Output TIA
- 5.0V Operation
- Automatic Gain Control
- 75µm 1270-1560nm InGaAs Photodetector
- 1000 MHz Minimum Bandwidth
- -28dBm Typical Sensitivity
- TO-46 Ultra Flat-Window or Lens Package

## APPLICATIONS

- Gigabit Ethernet (1.250 Gb/s)
- Fibre channel (1.064 Gb/s)

## PRODUCT DESCRIPTION

The ANADIGICS AMT121302, packaged in a TO46 flat window or lens can, is a 5V integrated photodetector and transimpedance amplifier (TIA) used to convert a long wavelength (1270-1560nm) input optical signal into a differential output voltage, and is manufactured in ANADIGICS' 6" GaAs wafer fabrication facility. The TIA maximizes the



receiver performance by providing a negative voltage to reverse bias the photodetector which allows the device to achieve high sensitivity and wide bandwidth. These products are readily designed into receivers and transceivers for Gigabit Ethernet and Fibre Channel applications.

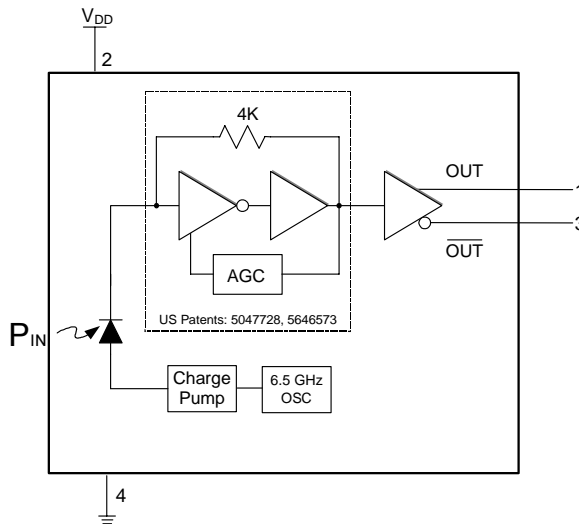


Figure 1: Block Diagram

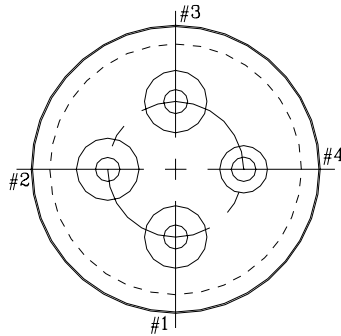


Figure 2: T46F/T46L Pin Outline (Bottom View)

Table 1: Package PIN Description

Pin	Description	Comment
1	$V_{OUT}$ - TIA Output Voltage (non-Inverted)	Logical '1' with optical input
2	$V_{DD}$ - Positive Supply Voltage	+5 Volts
3	$\overline{V_{OUT}}$ - TIA Output Voltage (Inverted)	Logical '0' with optical input
4	Ground	Case is grounded

**ELECTRICAL CHARACTERISTICS**

Table 2: Absolute Maximum Ratings

$V_{DD}$	7.0V
$P_{IN}$	+5dBm
$T_S$	Storage Temp. - 65 °C to 125 °C

Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Table 3: Electrical Characteristics

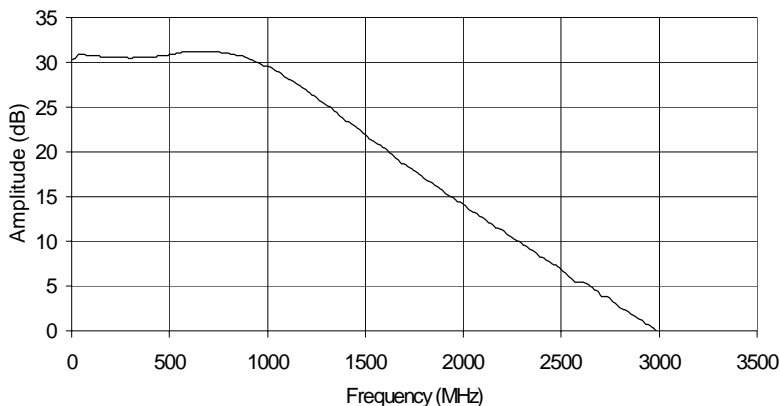
PARAMETER	MIN	TYP	MAX	UNIT
Wavelength ( $\lambda$ )	1270		1560	nm
Detector Diameter		75		$\mu\text{m}$
Small Signal Differential (@ 50 MHz) Responsivity <sup>(1)</sup> For T46F Package For T46L Package	2500 2000	3300		V/W
Bandwidth <sup>(1)</sup>	1000	1100		MHz
Low Frequency Cutoff		800		kHz
Output Resistance	25	40	60	$\Omega$
Output Offset Voltage		2.2		V
Optical Overload <sup>(2)</sup>	- 3	0		dBm
Optical Sensitivity <sup>(2)</sup> For T46F Package For T46L Package	-26 -25	-28		dBm
Differential Output Voltage <sup>(3), (4)</sup>		350	600	mV
$T_{\text{RISE}}$ & $T_{\text{FALL}}$ ( 20 - 80% ) <sup>(3), (4)</sup>		160	260	ps
Duty Cycle Distortion <sup>(3), (5)</sup>		3	6	%
RMS Jitter <sup>(3), (5), (6)</sup>		15	30	ps
Total Jitter (pk-pk) <sup>(3), (5), (7)</sup>		90	150	ps
Supply Current		35	50	mA
Operating Voltage Range	+ 4.5	+ 5.0	+ 5.5	V
Operating Ambient Temperature Range	0		70	$^{\circ}\text{C}$

Notes:

1. Measured at -17 dBm optical input power with a SMF and output connected into  $R_L = 100 \Omega$  (differential).
2. Measured at  $10^{-10}$  BER with a  $2^7-1$  PRBS, 1.25 Gb/s.
3. Input optical power = -3 dBm,  $R_L = 100 \Omega$  (differential).
4. Measured with a 625 MHz, 50% duty cycle square wave.
5. Measured with a 1.25 Gb/s,  $2^7-1$  PRBS.
6.  $1\sigma$  about the center eye crossing.
7.  $6\sigma$  about the center eye crossing.

PERFORMANCE DATA

Figure 3: Frequency Response \*



\* Calibrated with an optical reference receiver with a gain of 21.62 dB at 50 MHz and a responsivity of 11.77462 A/W.

Figure 4: Eye Diagram with an Optical Input Power of -3.0dBm

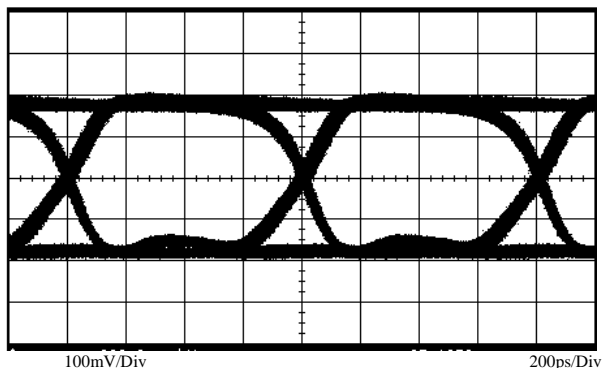


Figure 5: Eye Diagram with an Optical Input Power of -17dBm

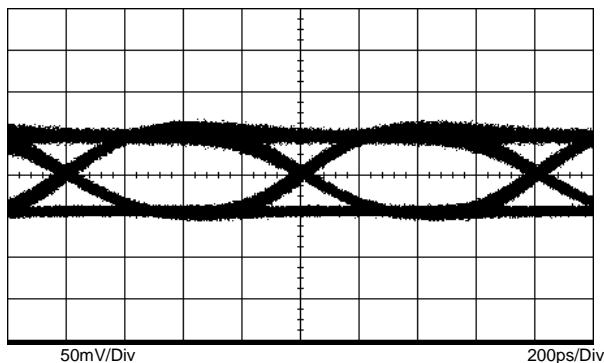


Figure 6: Supply Current vs. Case Temperature

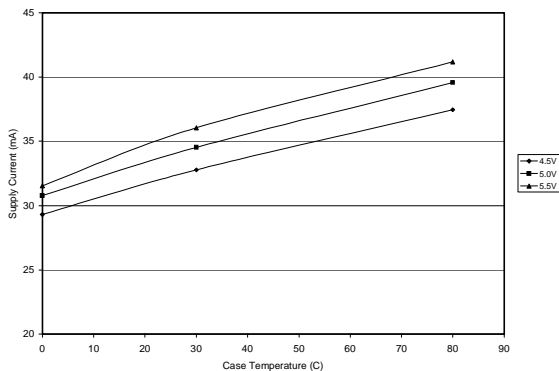


Figure 7: Bandwidth vs. Case Temperature

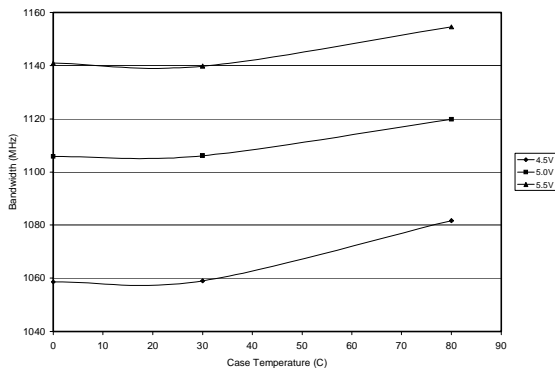


Figure 8: Differential Responsivity vs. Temperature

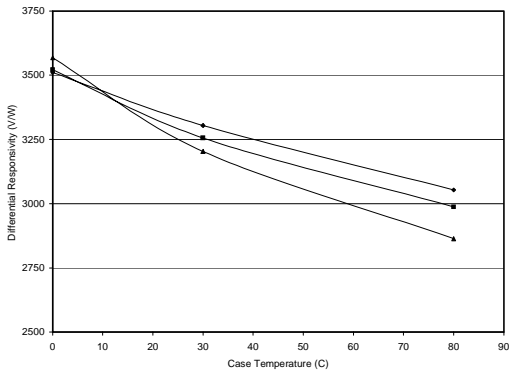
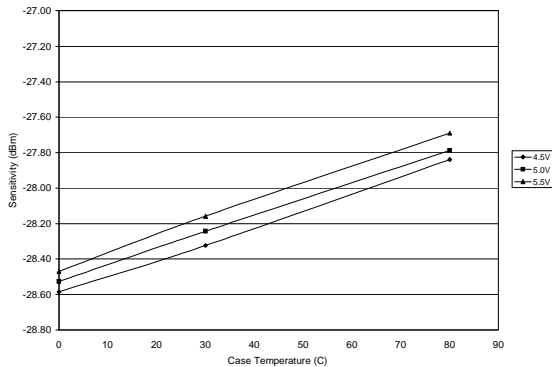


Figure 9: Sensitivity vs. Case Temperature



MEASUREMENT METHODS

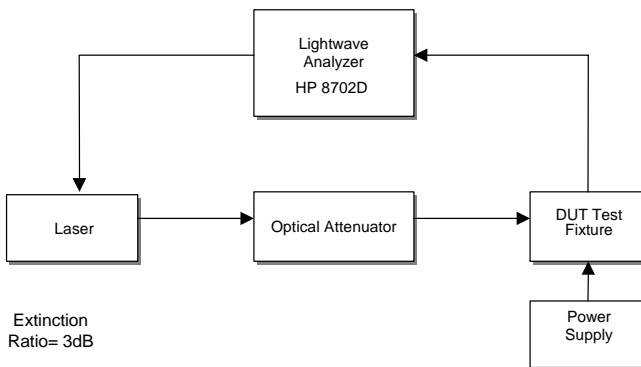


Figure 10: Test Setup for Frequency Response

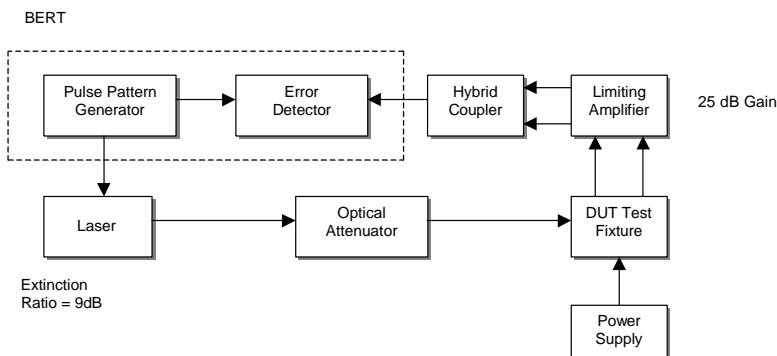


Figure 11: Test Setup for Sensitivity

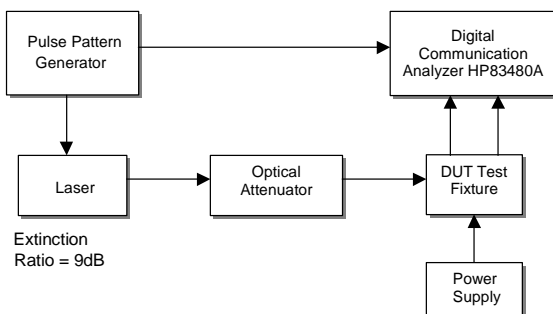
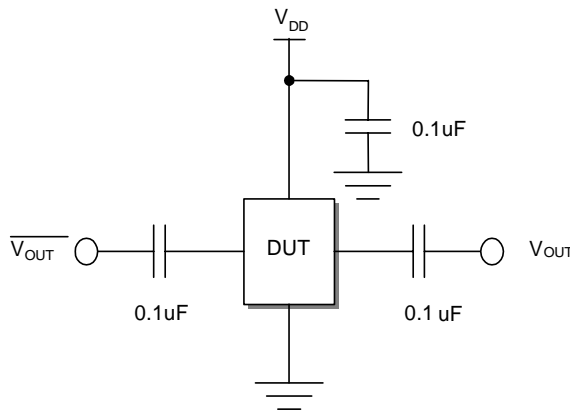
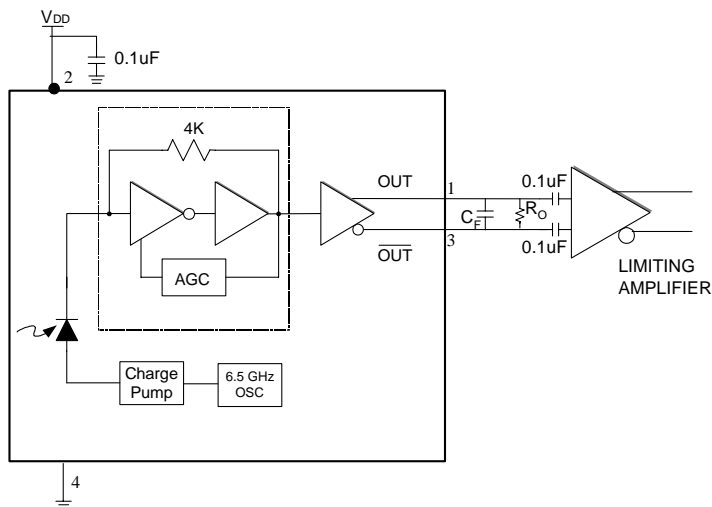


Figure 12: Test Setup for Eye Measurements



**Figure 13: DUT Test Fixture Schematic**

**APPLICATION INFORMATION**



**Figure 14: Application Schematic**

$C_F$  is an optional single pole noise filter

$$C_F = \frac{1}{2\pi f_c R}$$

$f_c$  is the desired cutoff frequency

$$R = 50 \Omega$$

$R_O$  is required with high input resistance limiting amplifiers

$$R_O = 100 \Omega$$

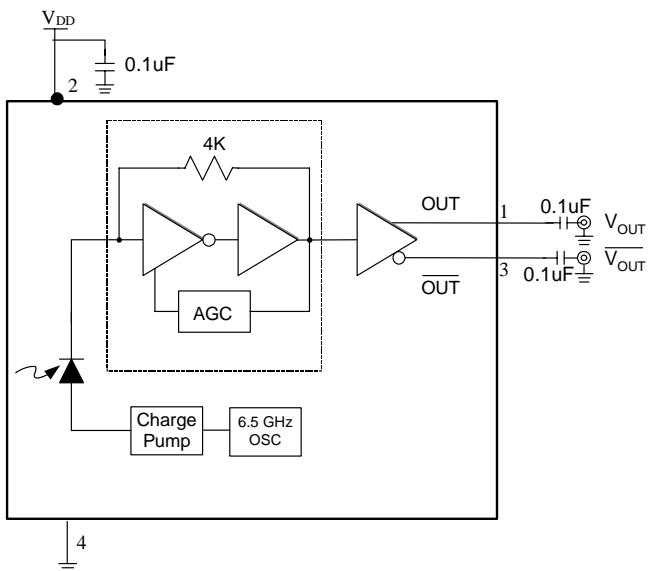


Figure 15: Evaluation Board Schematic

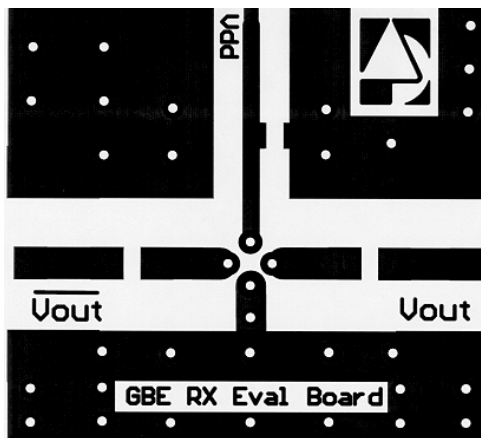


Figure 16: Evaluation Board Layout



PACKAGE OUTLINE

TO46-1300nm DIFFERENTIAL FLAT WINDOW

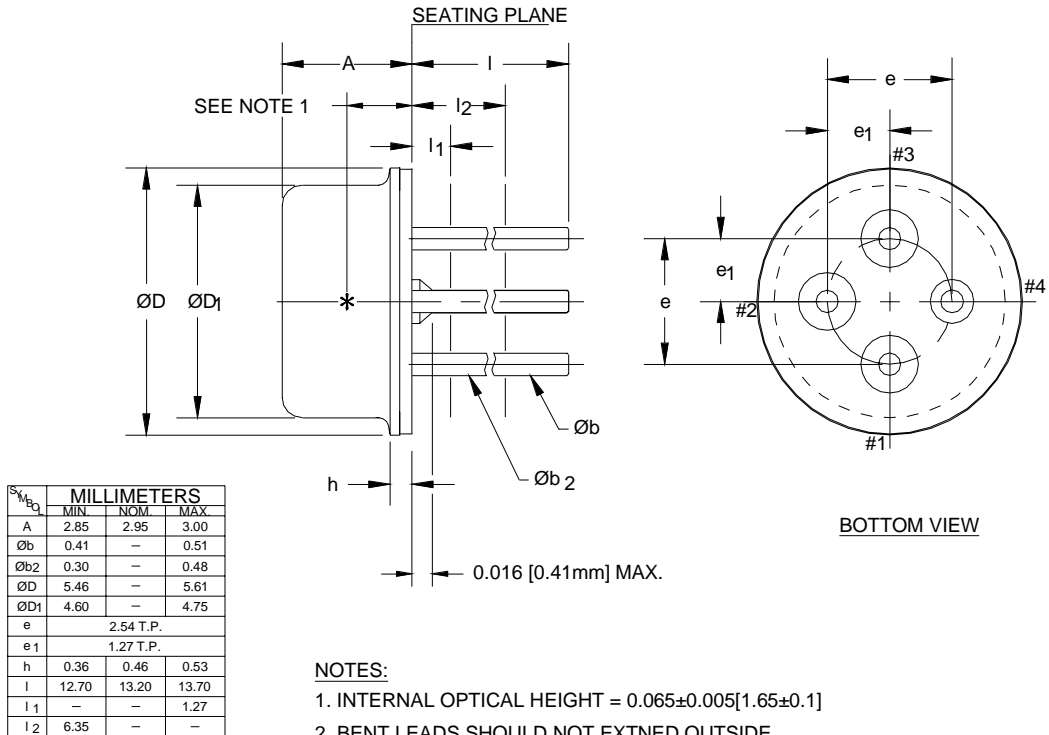
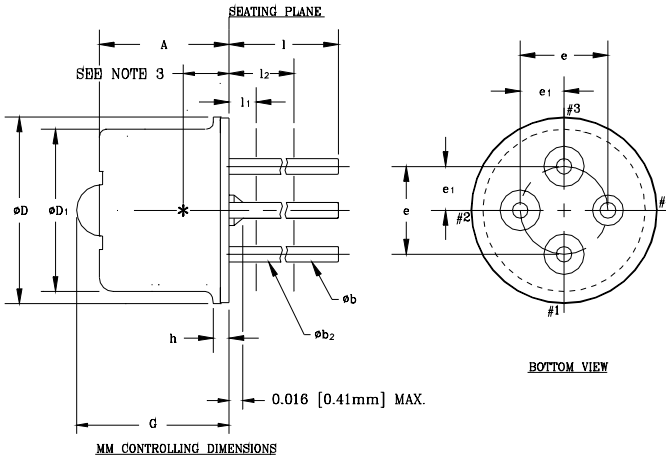


Figure 17: T46F Package Outline Diagram



MM CONTROLLING DIMENSIONS

Symbol	INCHES		MILLIMETERS		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	--	0.160	--	4.00	
øb	0.016	0.020	0.41	0.51	1
øb2	0.012	0.019	0.30	0.48	1
øD	0.212	0.218	5.38	5.54	
øD1	0.181	0.187	4.60	4.75	
e	0.100	T.P.	2.54	T.P.	2
e1	0.050	T.P.	1.27	T.P.	2
h	0.014	0.022	0.36	0.56	
l	0.500	0.540	12.70	13.70	1
l1	--	0.050	--	1.27	1
l2	0.250	--	6.35	--	1
d	--	0.190	--	4.66	7

NOTES:

- (FOUR LEADS) øb2 APPLIES BETWEEN l1 AND l2 . øb APPLIES BETWEEN l2 AND 0.5 [12.70mm] FROM SEATING PLANE. DIAMETER IS UNCONTROLLED IN l1 AND BEYOND 0.5 [12.70mm] TO END OF PIN.
- MAXIMUM DIAMETER LEADS AT A GAGING PLANE 0.054 [1.37mm]+0.001 [0.025mm] -0.000 [0.000mm] BELOW SEATING PLANE TO BE WITHIN 0.007 [0.178mm] OF THEIR TRUE POSITION RELATIVE TO MAXIMUM-WIDTH TAB AND TO THE MAXIMUM 0.212 [5.40mm] DIAMETER MEASURED WITH A SUITABLE GAGE. WHEN GAGE IS NOT USED, MEASUREMENT WILL BE MADE AT 0.250 [6.35mm] FROM SEATING PLANE.
- INTERNAL OPTICAL HEIGHT = 0.052±0.003[1.32±0.08] DIE PLACEMENT ACCURACY FOR REF. ONLY.
- BENT LEADS SHOULD NOT EXTEND OUTSIDE DIAMETER (øD) OF CAP OR TOUCH EACH OTHER.
- ALL DIMENSIONS ARE REFERENCE ONLY-EXCEPT A, D & h.
- DETECTOR DIODE PLACEMENT ACCURACY: φ±0.15MM[0.006] ALL DIRECTIONS
- LENS HEIGHT = 0.65±0.1 [0.026±0.004]

Figure 18: T46L Package Outlying Diagram

NOTES

ORDERING INFORMATION

Part Number	Package Option	Package Description
AMT121302T46F	TO-46F	Ultra Flat Window Package
AMT121302T46L	TO-46L	Lens Package



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