

APD module C4777 series

APD module integrated with peripheral circuits



Features

- Uses high sensitivity APD
Two types of APDs with different active areas ($\phi 0.5$ mm, $\phi 3.0$ mm) are provided.
- Choice of high sensitivity type and low-light-level detection type
C4777 detects optical signals from 10 kHz to 100 MHz pulsed light and is suitable for spatial light transmission and rangefinder applications. C4777-01 provides a high photoelectric sensitivity of 1.25×10^9 V/W and low NEP of $2 \text{ fW/Hz}^{1/2}$, making it excellent for fluorescence measurement and NOx monitors where low-light-level detection is essential.
- Built-in temperature control circuit
An APD chip, thermoelectric cooler and thermosensor are sealed in the same package along with the temperature control circuit, to keep the APD chip temperature constant and ensure stable measurements.
- Simple operation
Operates by just connecting to a DC power supply (+5 V, ± 15 V).

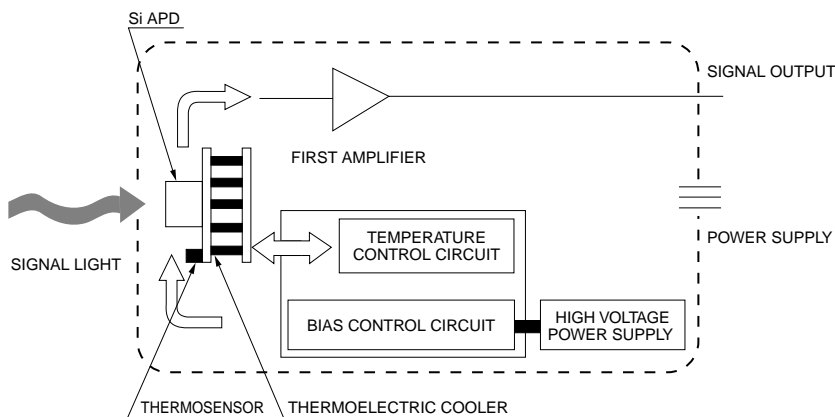
Applications

- | |
|---|
| C4777 |
| <ul style="list-style-type: none"> ● Spatial light transmission ● Optical communication ● Rangefinder |
| C4777-01 |
| <ul style="list-style-type: none"> ● Fluorescence measurement ● NOx monitor sensor ● Particle counters |

Selection guide

Parameter	C4777	C4777-01	Unit
Active area	$\phi 0.5$	$\phi 3.0$	mm
Photo sensitivity	-2.5×10^5	-1.25×10^9	V/W
Frequency bandwidth	10 k to 100 M	DC to 5 k	Hz

Block diagram



KACCC0099EA

■ Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Positive supply voltage	-		+7	V
Positive supply voltage	-		+16	V
Negative supply voltage	-		-16	V
Input power	-		10	mW
Operating temperature	Topr		10 to 40	°C
Storage temperature	Tstg		-10 to +60	°C
Operating/storage humidity	-	No condensation	70 % RH below	-

■ Specification (Typ. Ta=25 °C, Vcc=+5 V, +15 V, unless otherwise noted)

● Photoelectric section (APD)

Parameter	Symbol	Condition	C4777	C4777-01	Unit
Active area	A		φ0.5	φ3.0	mm
Peak sensitivity wavelength	λp		800		nm
Spectral response range	λ		400 to 1000		nm
Photo sensitivity	S	λ=800 nm, M=1	0.5		A/W
Gain	M	λ=800 nm	100	50	times
Thermoelectric cooler	-		One-stage	Two-stage	-
Cooling temperature	-		0		°C
Temperature stability of gain	-	Ta=10 to 40 °C	±3		%

● Signal amplification section

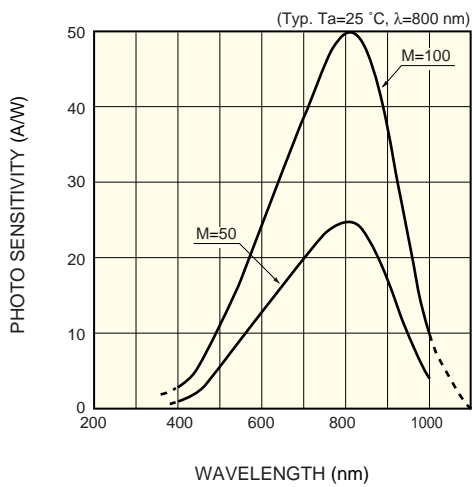
C4777							
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	
Cut-off frequency	High band	fc	-3 dB	95	100	-	MHz
	Low band			-	10	15	kHz
Noise equivalent power	NEP	λ=800 nm	-	80	120	fW/Hz ^{1/2}	
Feedback resistance	Rf		-	10	-	kΩ	
Photoelectric sensitivity	-	APD include, M=100 λ=800 nm	-2.0	-2.5	-3.0	× 10 ⁵ V/W	
Output impedance	-		-	50	-	Ω	
Maximum input light level	-		0.6	0.8	-	μW	
Minimum detection limit	-		-	0.80	1.20	nWr.m.s.	

C4777-01							
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	
Cut-off frequency	High band	fc	-3 dB	4	5	-	kHz
	Low band			-	DC	-	-
Noise equivalent power	NEP	λ=800 nm	-	2	4	fW/Hz ^{1/2}	
Feedback resistance	Rf		-	50	-	MΩ	
Photoelectric sensitivity	-	APD include, M=50 λ=800 nm	-1.0	-1.25	-1.5	× 10 ⁹ V/W	
Maximum input light level	-		8.8	9.6	-	nW	
Minimum detection limit	-		-	0.14	0.28	pWr.m.s.	

■ General ratings

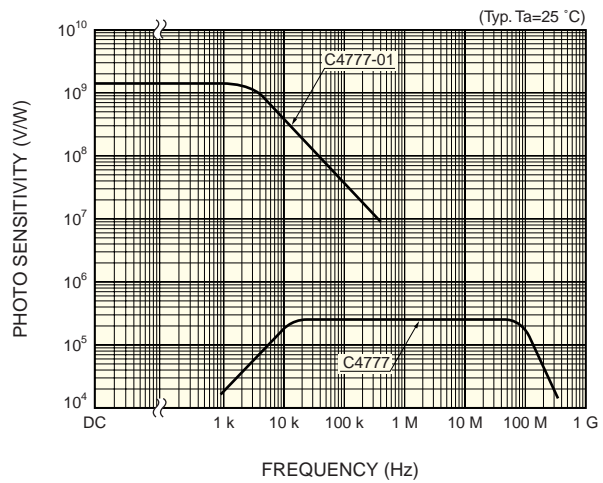
Parameter		Min.	Typ.	Max.	Unit
Power supply	+5 V	+4.4	+5	+5.6	V
	+15 V	+14.4	+15	+15.6	
	-15 V	-14.4	-15	-15.6	
Current consumption	C4777 (+5 V)	-	+1.2	+1.5	A
	C4777 (+15 V)	-	+0.2	+0.3	
	C4777 (-15 V)	-	-0.01	-0.02	
Current consumption	C4777-01 (+5 V)	-	+0.5	+1.0	A
	C4777-01 (+15 V)	-	+0.15	+0.30	
	C4777-01 (-15 V)	-	-0.01	-0.02	
Dimensional outline	C4777	103 × 60 × 40			mm
	C4777-01	106.6 × 60 × 40			
Weight		350			g

■ Spectral response



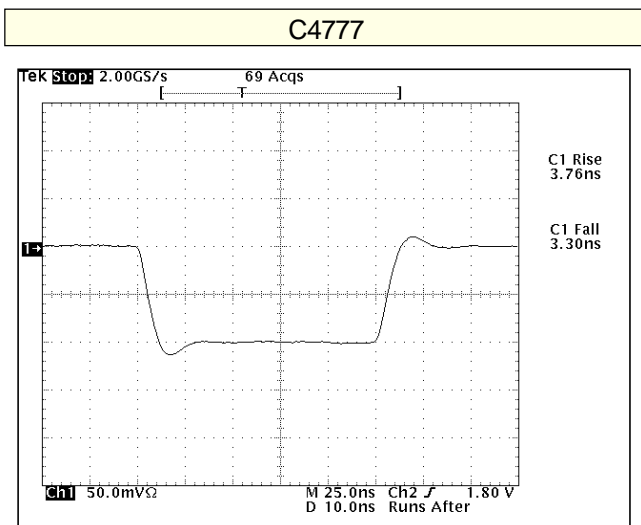
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■ Frequency response



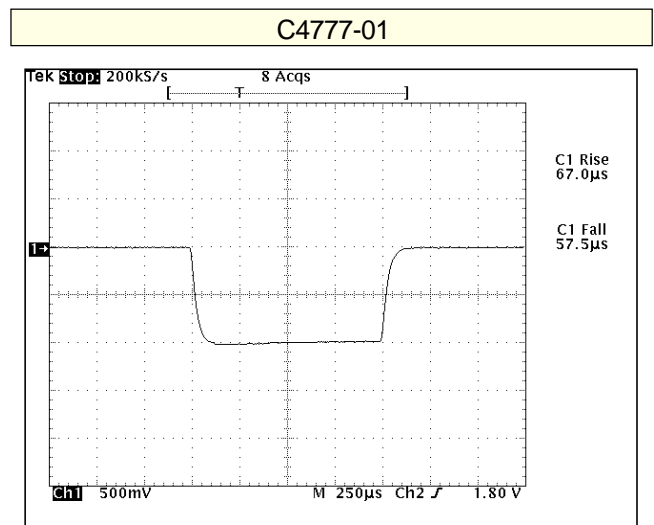
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■ Response to stepped light



Ta=25 °C, gain M=100, input pulse width=50 ns
X-axis: 10 ns/div., Y-axis: 50 mV/div.

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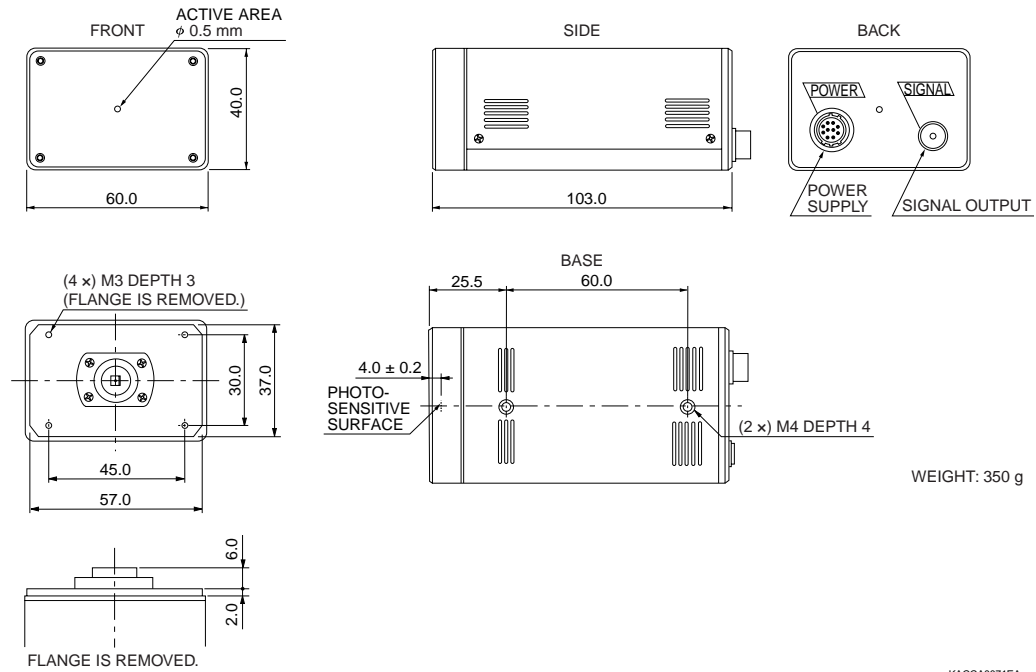


Ta=25 °C, gain M=50, input pulse width=1 ms
X-axis: 250 µs/div., Y-axis: 500 mV/div.

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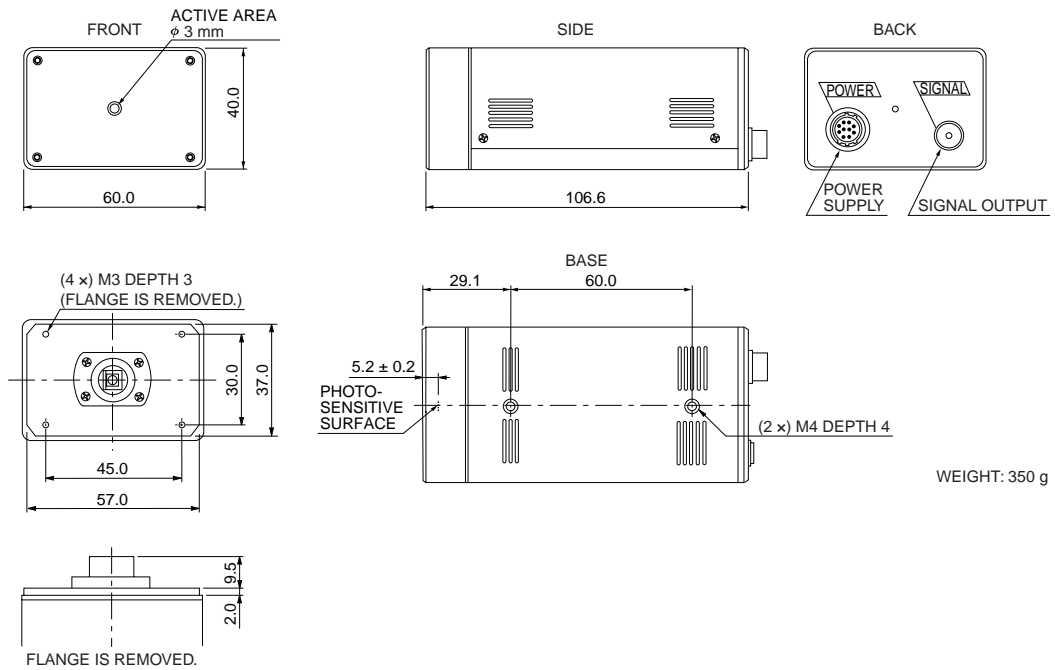
■ Dimensional outline (unit: mm)

C4777



When using C4777, be sure to terminate the output with a 50 Ω load.

C4777-01



When using C4777-01, do not terminate the output with a 50 Ω load.

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