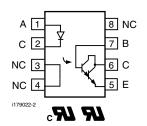


Optocoupler, Photodarlington Output, Low Input Current, High Gain, with Base Connection





FEATURES

- Isolation test voltage, 4000 V_{RMS}
- Material categorization:
 For definitions of compliance please see www.vishay.com/doc?99912





H

AGENCY APPROVALS

- UL1577, file no. E52744 system code Y
- cUL file no. E52744, equivalent to CSA bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5) approved, contact customer service if this option is required

DESCRIPTION

The VO221AT, VO222AT, VO223AT are high current transfer ratio (CTR) optocouplers with a gallium arsenide infrared LED emitter and a silicon NPN photodarlington transistor detector.

The device has a CTR tested at 1 mA LED current. This low drive current permits easy interfacing from CMOS to LSTTL or TTL.

ORDERING INFORMATION								
v	0	2	2	#	Α	Т	SOIC-8	
PART NUMBER							6.1 mm	
AGENCY CERTIF	AGENCY CERTIFIED/PACKAGE CTR (%)							
UL, cUL	≥ 100		≥ 200		≥ 500			
SOIC-8 VO2				VO221AT		VO222AT	VO223AT	

ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT				
INPUT								
Peak reverse voltage		V_{R}	6	V				
Peak forward current	1 μs, 300 pps	I _{FM}	1	А				
Forward continuous current		I _F	60	mA				
Power dissipation		P _{diss}	90	mW				
Derate linearly from 25 °C			1.2	mW/°C				
OUTPUT								
Collector emitter breakdown voltage		BV _{CEO}	30	V				
Emitter collector breakdown voltage		BV _{ECO}	5	V				
Collector base breakdown voltage		BV _{CBO}	70	V				
I _{Cmax. DC}		I _{Cmax. DC}	50	mA				
I _{Cmax} .	t < 1 ms	I _{Cmax.}	100	mA				
Power dissipation		P _{diss}	150	mW				

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ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT				
COUPLER								
Derate linearly from 25 °C			2	mW/°C				
Isolation test voltage	t = 1 s	V_{ISO}	4000	V_{RMS}				
Total package dissipation (at 25 °C ambient) (LED and detector)		P _{tot}	240	mW				
Derate linearly from 25 °C			3.2	mW/°C				
Storage temperature		T _{stg}	- 40 to + 150	°C				
Operating temperature		T _{amb}	- 40 to + 100	°C				
Soldering time at 260 °C		T_{sld}	10	S				

Note

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not
implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute
maximum ratings for extended periods of the time can adversely affect reliability.

ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT		
INPUT								
Forward voltage	I _F = 1 mA	V _F		1	1.5	V		
Reverse current	V _R = 6 V	I _R		0.1	100	μA		
Capacitance	V _R = 0 V, f = 1 MHz	Co		25		pF		
OUTPUT								
Collector emitter breakdown voltage	I _C = 100 μA	BV _{CEO}	30			V		
Emitter collector breakdown voltage	$I_C = 10 \mu A$	BV _{ECO}	5			V		
Collector base breakdown voltage	$I_C = 10 \mu A$	BV _{CBO}	70			V		
Collector emitter leackage current	V _{CE} = 20 V	I _{CEO}			40	nA		
Collector base current		ICBO			1	nA		
Emitter base current		I _{EBO}			1	nA		
Collector emitter capacitance	V _{CE} = 10 V	C _{CE}		3.4		pF		
Saturation voltage, collector emitter	$I_{CE} = 0.5 \text{ mA}$	V _{CEsat}			1	V		
COUPLER								
Capacitance (input to output)		C _{IO}		0.5		pF		

Note

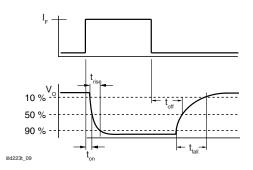
• Minimum and maximum values are tested requierements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

CURRENT TRANSFER RATIO (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER TEST CONDITION PART SYMBOL MIN. TYP. MAX. UNIT								
		VO221AT	CTR _{DC}	100			%	
I _C /I _F	$I_F = 1 \text{ mA}, V_{CE} = 5 \text{ V}$	VO222AT	CTR _{DC}	200			%	
		VO223AT	CTR _{DC}	500			%	

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SWITCHING CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	TEST CONDITION SYMBOL MIN. TYP. MA						
Turn-on time	V_{CC} = 10 V, R_L = 100 Ω , I_F = 5 mA	t _{on}		3		μs		
Turn-off time	$V_{CC} = 10 \text{ V. R}_{I} = 100 \Omega$. $I_{E} = 5 \text{ mA}$	toff		3		us		



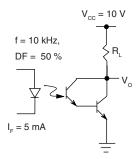


Fig. 1 - Switching Test Circuit

SAFETY AND INSULATION RATINGS								
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT		
Climatic classification	according to IEC 68 part 1			40/100/21				
Polution degree				2				
Comparative tracking index		CTI	175		399			
Isolation test voltage	1 s	V _{ISO}	4000			V_{RMS}		
Peak transient overvoltage		V _{IOTM}	6000			V		
Peak insulation voltage		V_{IORM}	560			V		
Resistance (input to output)		R _{IO}		10 ¹¹		Ω		
Safety rating - power output		P _{SO}			350	mW		
Safety rating - input current		I _{SI}			150	mA		
Safety rating - temperature		T _{SI}			165	°C		
External creepage distance			4			mm		
External clearance distance			4			mm		
Internal creepage distance			3.3			mm		
Insulation thickness			0.2			mm		

Note

• As per IEC 60747-5-2, § 7.4.3.8.1, this optocoupler is suitable for "safe electrical insulation" only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

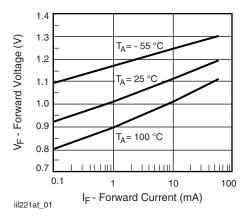


Fig. 2 - Forward Voltage vs. Forward Current

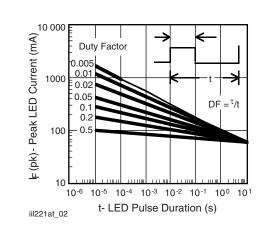


Fig. 3 - Peak LED Current vs. Duty Factor, τ

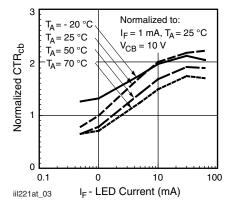


Fig. 4 - Normalized CTR_{cb} vs. I_F

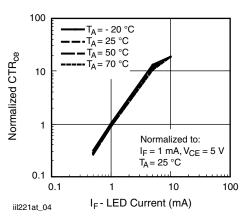


Fig. 5 - Normalized CTR_{CE} vs. LED Current

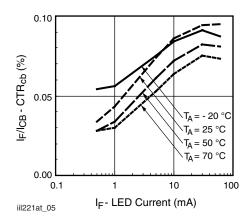


Fig. 6 - CTR_{CB} vs. LED Current

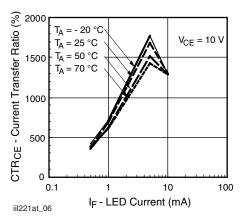


Fig. 7 - CTR vs. LED Current

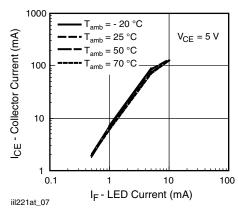


Fig. 8 - Collector Current vs. LED Current

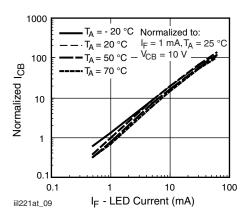


Fig. 10 - Normalized I_{CB} vs. I_F

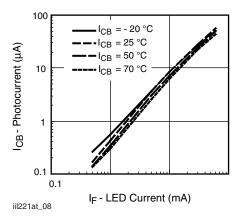
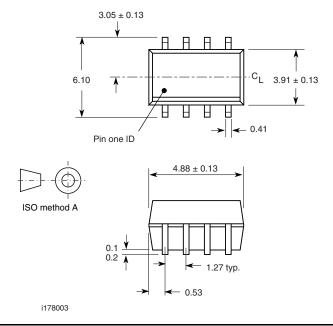
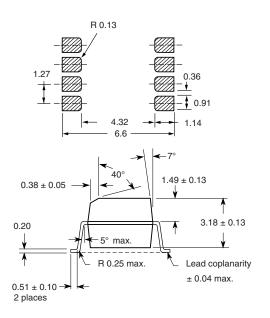


Fig. 9 - Photocurrent vs. LED Current

PACKAGE DIMENSIONS in millimeters





PACKAGE MARKING (example)



TAPE AND REEL PACKAGING

Dimensions in millimeters

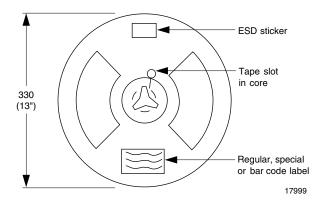


Fig. 11 - Tape and Reel Shipping Medium (EIA-481, revision A, and IEC 60286), 2000 units per reel

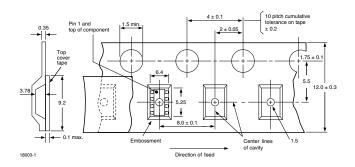


Fig. 12 - Tape Dimensions, 2000 Parts per Reel



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