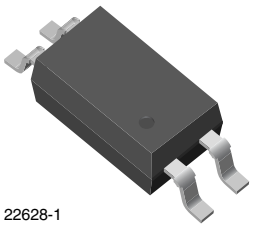
Optocoupler, Phototransistor Output, Low Input Current, SSOP-4, Half Pitch, Mini-Flat Package



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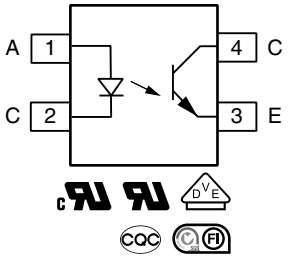


FEATURES

- High CTR with low input current
- Low profile package (half pitch)
- High collector emitter voltage, V_{CEO} = 80 V
- Isolation test voltage = 3750 V_{RMS}
- Low coupling capacitance
- High common mode transient immunity
- Material categorization:
  For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

DESCRIPTION

The VOS615A series has a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 4-pin 50 mil lead pitch mini-flat package.

It features a high current transfer ratio at low input current, low coupling capacitance, and high isolation voltage.

The coupling devices are designed for signal transmission between two electrically separated circuits.

APPLICATIONS

- Telecom
- Industrial controls
- Battery powered equipment
- Office machines
- Programmable controllers

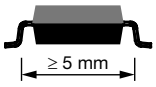
AGENCY APPROVALS

Safety application model number covering all products in this datasheet is VOS615A. This model number should be used when consulting safety agency documents.

- UL1577, file no. E52744
- cUL
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- FIMKO EN 60065, EN 60950-1
- CQC GB4943.1-2011 and GB8898-2011 (suitable for installation altitude below 2000 m)

ORDERING INFORMATION

V	O	S	6	1	5	A	-	#	X	0	0	1	T
PART NUMBER								CTR BIN	PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	CTR (%)				
	10 mA				
UL, cUL, FIMKO, CQC	**40 to 600**	**40 to 80**	**63 to 125**	**100 to 200**	**160 to 320**
SSOP-4, 50 mil pitch	VOS615AT	VOS615A-1T	VOS615A-2T	VOS615A-3T	VOS615A-4T
UL, CUL, BSI, FIMKO, CQC, VDE (option 1)	**40 to 600**	**40 to 80**	**63 to 125**	**100 to 200**	**160 to 320**
SSOP-4, 50 mil pitch	VOS615A-X001T	VOS615A-1X001T	VOS615A-2X001T	VOS615A-3X001T	VOS615A-4X001T

Note

- Additional options may be possible, please contact sales office.

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ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	6	V
Power dissipation		P_{diss}	70	mW
Forward current		I_F	50	mA
OUTPUT				
Collector emitter voltage		V_{CEO}	80	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
Power dissipation		P_{diss}	150	mW
COUPLER				
Isolation test voltage between emitter and detector	t = 1 min	V_{ISO}	3750	V_{RMS}
Total power dissipation		P_{tot}	170	mW
Storage temperature range		T_{stg}	- 55 to + 150	°C
Ambient temperature range		T_{amb}	- 55 to + 110	°C
Junction temperature		T_j	125	°C
Soldering temperature [1]	t = 10 s	T_{sld}	260	°C

Notes

- 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.

(1) Refer to reflow profile for soldering conditions for surface mounted devices.

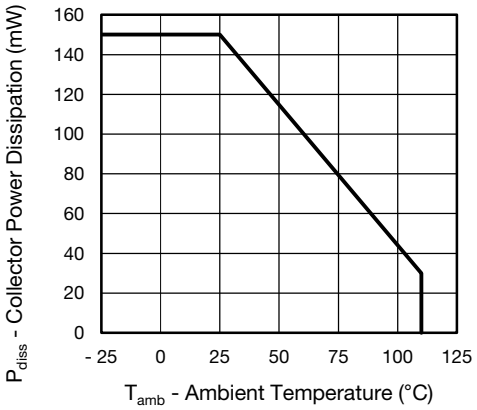

Fig. 1 - Power Dissipation vs. Ambient Temperature

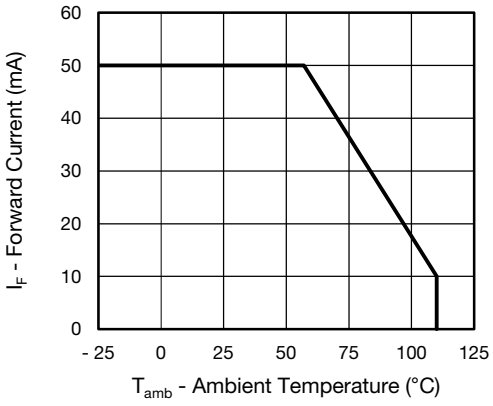

Fig. 2 - Forward Current vs. Ambient Temperature

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ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 50 mA	V_F		1.2	1.5	V
Reverse current	V_R = 6 V	I_R		0.01	10	µA
Capacitance	V_R = 0 V, f = 1 MHz	C_I		7.3		pF
OUTPUT						
Collector emitter leakage current	V_{CE} = 10 V	I_{CEO}		0.3	100	nA
Collector emitter breakdown voltage	I_C = 100 µA	BV_{CEO}	80			V
Emitter collector breakdown voltage	I_E = 10 µA	BV_{ECO}	7			V
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz	C_{CE}		5		pF
COUPLER						
Collector emitter saturation voltage	I_F = 10 mA, I_C = 2.5 mA	V_{CEsat}		0.25	0.4	V
Cut-off frequency	I_F = 10 mA, V_{CC} = 5 V, R_L = 100 Ω	f_{ctr}		155		kHz

Note

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. 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**
I_C/I_F	I_F = 10 mA, V_{CE} = 5 V	VOS615A	CTR	50		600	%
		VOS615A-1	CTR	40		80	%
		VOS615A-2	CTR	63		125	%
		VOS615A-3	CTR	100		200	%
		VOS615A-4	CTR	160		320	%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
NON-SATURATED						
Rise and fall time	I_C = 2 mA, V_{CC} = 5 V, R_L = 100 Ω	t_r		3		µs
Fall time		t_f		4		µs
Turn-on time		t_{on}		5		µs
Turn-off time		t_{off}		5		µs
SATURATED						
Rise and fall time	I_F = 1.6 mA, V_{CC} = 5 V, R_L = 1.9 kΩ	t_r		3		µs
Fall time		t_f		12		µs
Turn-on time		t_{on}		4		µs
Turn-off time		t_{off}		18		µs

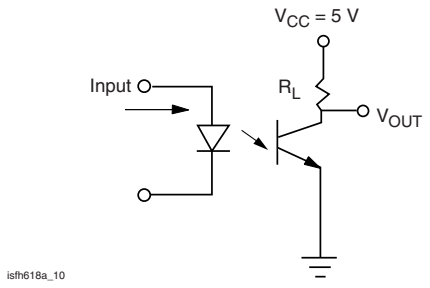

Fig. 3 - Test Circuit

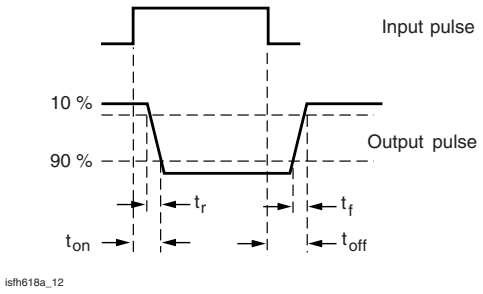

Fig. 4 - Test Circuit and Waveforms

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SAFETY AND INSULATION RATINGS				
PARAMETER		**SYMBOL**	**VALUE**	**UNIT**
MAXIMUM SAFETY RATINGS				
Output safety power		P_{SO}	300	mW
Input safety current		I_{si}	200	mA
Safety temperature		T_S	150	°C
Comparative tracking index		CTI	175	
INSULATION RATED PARAMETERS				
Maximum withstanding isolation voltage	40 % to 60 % RH, AC test of 1 min	V_{ISO}	3750	V_{RMS}
Maximum transient isolation voltage		V_{IOTM}	6000	V_{peak}
Maximum repetitive peak isolation voltage		V_{IORM}	565	V_{peak}
Insulation resistance	T_{amb} = 25 °C, V_{DC} = 500 V	R_{IO}	10^{12}	Ω
Isolation resistance	T_{amb} = 100 °C, V_{DC} = 500 V	R_{IO}	10^{11}	Ω
Climatic classification (according to IEC 68 part 1)			55/110/21	
Environment (pollution degree in accordance to DIN VDE 0109)			2	
Creepage distance			≥ 5	mm
Clearance distance			≥ 5	mm
Insulation thickness		DTI	≥ 0.4	mm

Note

- As per IEC 60747-5-5, § 7.4.3.8.2, 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)

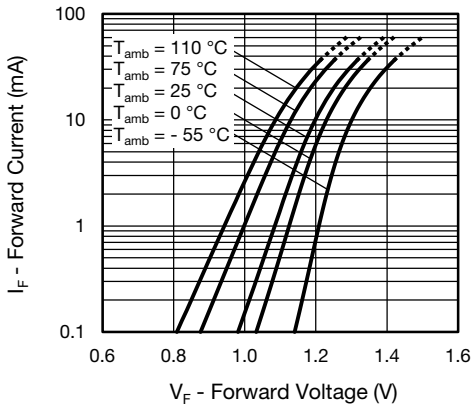

Fig. 5 - Forward Voltage vs. Forward Current

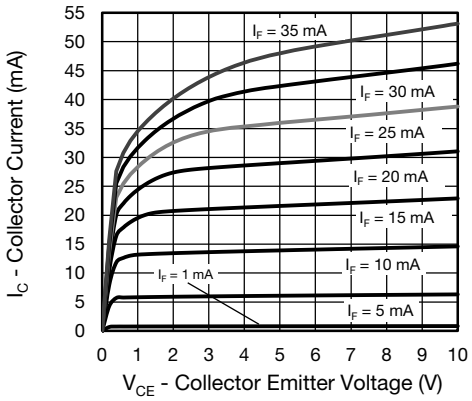

Fig. 6 - Collector Current vs. Collector Emitter Voltage

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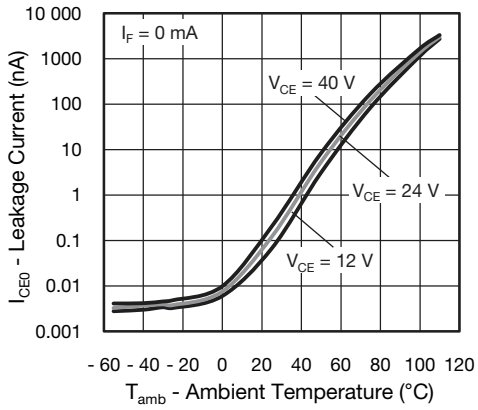

Fig. 7 - Leakage Current vs. Ambient Temperature

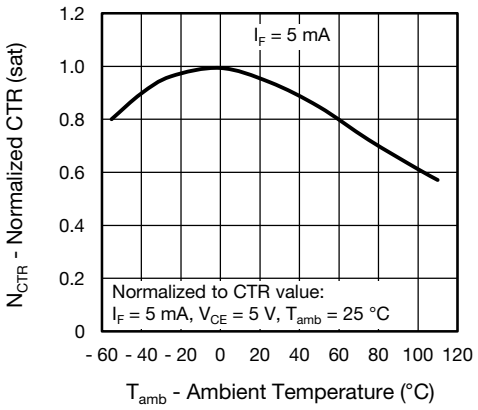

Fig. 10 - Normalized Current Transfer Ratio (saturated) vs. Ambient Temperature

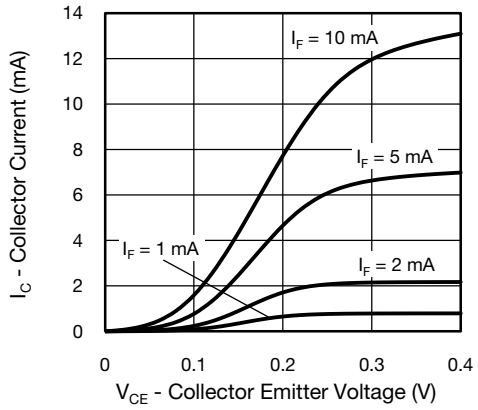

Fig. 8 - Collector Current vs. Collector Emitter Voltage

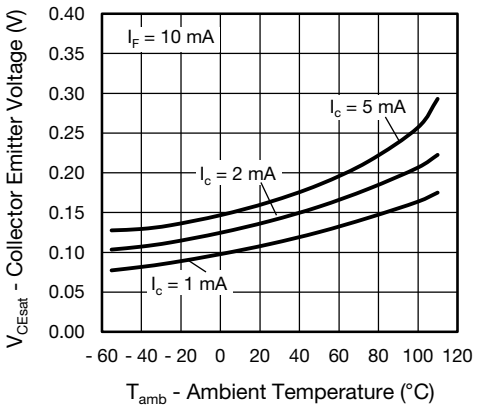

Fig. 11 - Collector Emitter Voltage vs. Ambient Temperature

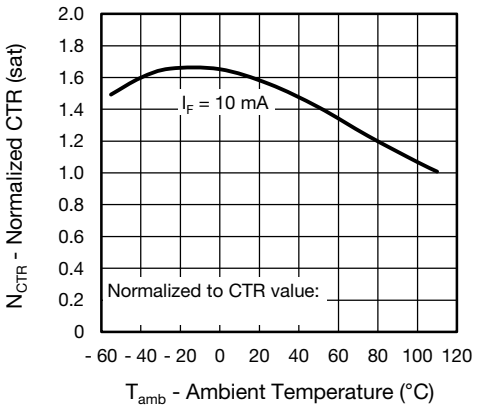

Fig. 9 - Normalized Current Transfer Ratio (sat) vs. Ambient Temperature

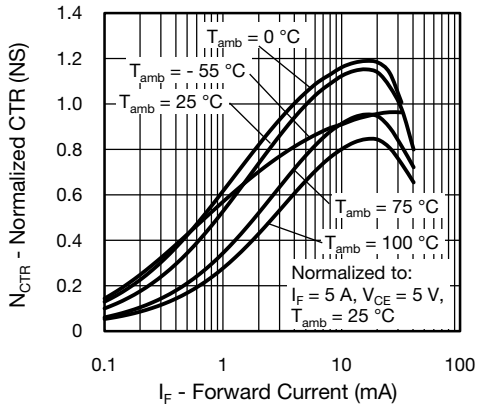

Fig. 12 - Normalized CTR (non-saturated) vs. Forward Current

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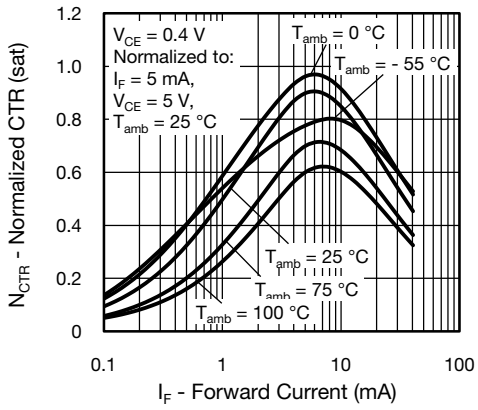

Fig. 13 - Normalized CTR (saturated) vs. Forward Current

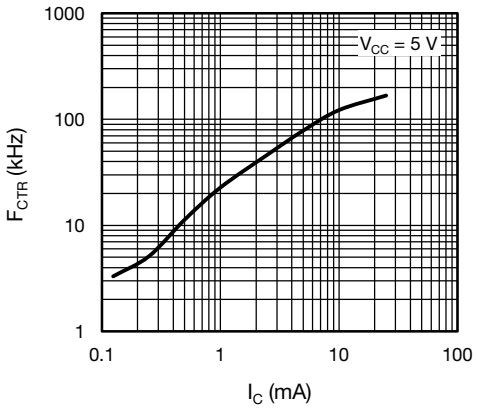

Fig. 15 - F_{CTR} vs. Collector Current

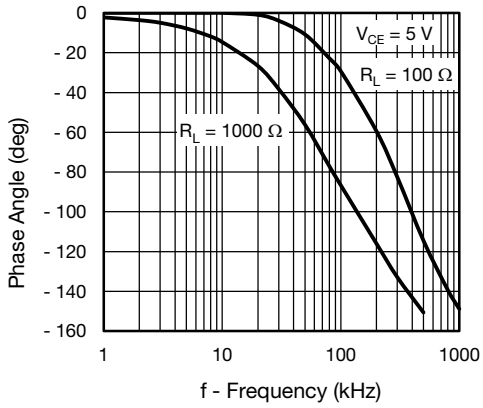

Fig. 14 - F_{CTR} vs. Phase Angle

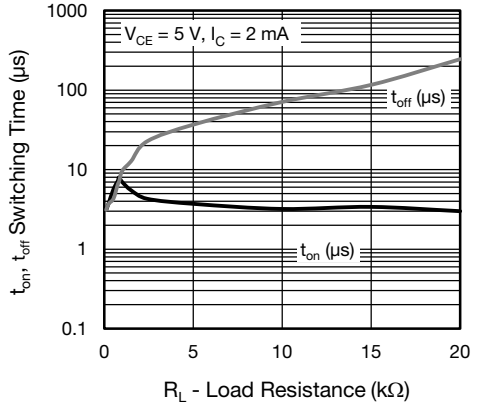

Fig. 16 - Switching Time vs. Load Resistance

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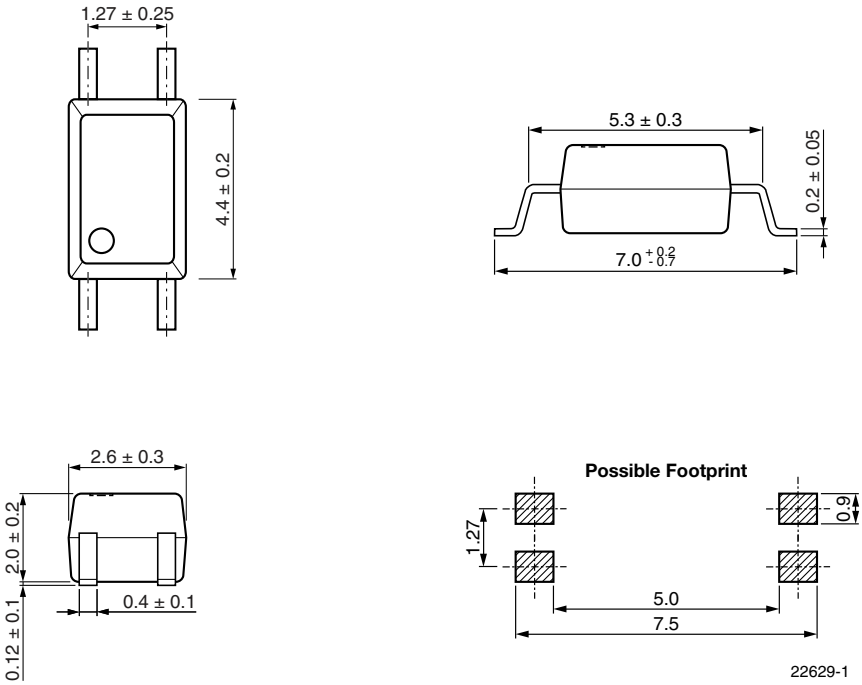
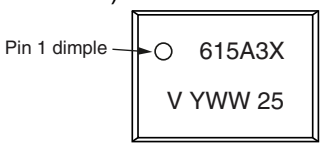
PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING (example VOS615A-3X001T)



Notes

- Option 1 is reflected with letter “X”.
- Tape and reel suffix (T) is not part of the package marking.

TAPE AND REEL DIMENSIONS in millimeters

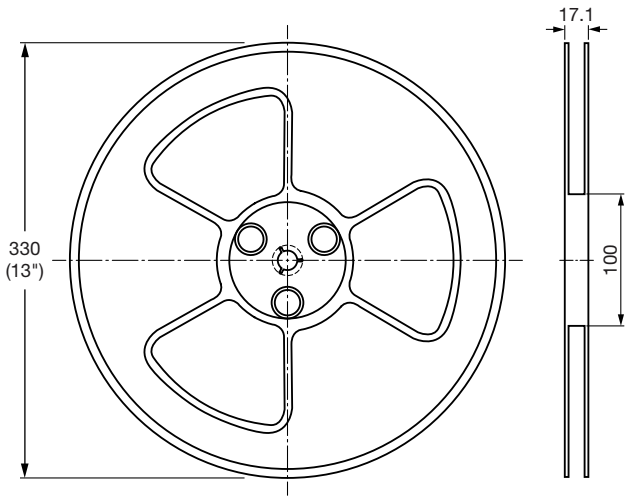


Fig. 17 - Reel Dimensions (3000 units per reel)

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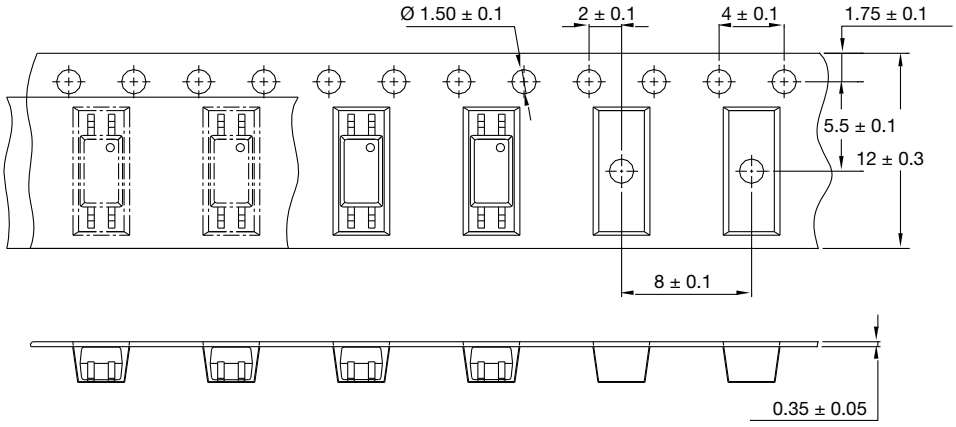

Fig. 18 - Tape Dimensions

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