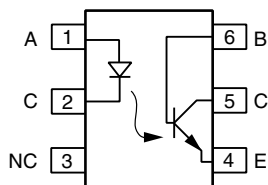
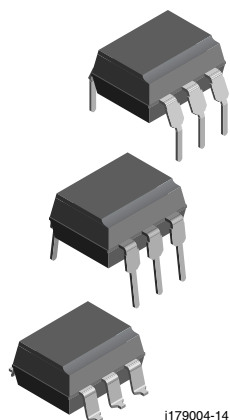


# Optocoupler, Phototransistor Output, with Base Connection, 110 °C Rated



i179004-14

## DESCRIPTION

The CNY117 is a 110 °C rated optocoupler consisting of a gallium arsenide infrared emitting diode optically coupled to a silicon planar phototransistor detector in a plastic plug-in DIP-6 package.

The coupling device is suitable for signal transmission between two electrically separated circuits. The potential difference between the circuits to be coupled is not allowed to exceed the maximum permissible reference voltages.

## FEATURES

- Operating temperature from - 55 °C to + 110 °C
- Breakdown voltage, 5000 V<sub>RMS</sub>
- Long term stability
- Industry standard dual-in-line package
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

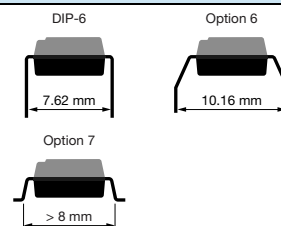
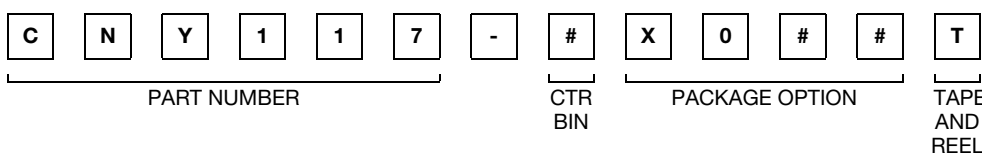
## APPLICATIONS

- AC adapter
- SMPS
- PLC
- Factory automation
- Game consoles

## AGENCY APPROVALS

- UL file no. E52744
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- BSI: EN 60065, EN 60950-1
- CQC

## ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	CTR (%)			
<b>UL, cUL, BSI</b>	<b>40 to 80</b>	<b>63 to 125</b>	<b>100 to 200</b>	<b>160 to 320</b>
DIP-6	CNY117-1	CNY117-2	CNY117-3	CNY117-4
DIP-6, 400 mil, option 6	CNY117-1X006	CNY117-2X006	CNY117-3X006	CNY117-4X006
SMD-6, option 7	CNY117-1X007T	CNY117-2X007T	CNY117-3X007T	CNY117-4X007T
<b>VDE, UL, cUL, BSI</b>	<b>40 to 80</b>	<b>63 to 125</b>	<b>100 to 200</b>	<b>160 to 320</b>
DIP-6	CNY117-1X001	CNY117-2X001	CNY117-3X001	CNY117-4X001
DIP-6, 400 mil, option 6	CNY117-1X016	CNY117-2X016	CNY117-3X016	CNY117-4X016
SMD-6, option 7	CNY117-1X017T	CNY117-2X017T	CNY117-3X017T	CNY117-4X017T

## Note

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



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	6.0	V
DC forward current		$I_F$	60	mA
Surge forward current	$t \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	2.5	A
Power dissipation		$P_{diss}$	70	mW
<b>OUTPUT</b>				
Collector emitter breakdown voltage		$BV_{CEO}$	70	V
Collector current		$I_C$	50	mA
Collector peak current	$t_p/T = 0.5, t_p \leq 10\text{ ms}$	$I_{CM}$	100	mA
Output power dissipation		$P_{diss}$	150	mW
<b>COUPLER</b>				
Isolation test voltage between emitter and detector referred to standard climate 23/50 DIN 50014	$t = 1\text{ min}$	$V_{ISO}$	5000	$V_{RMS}$
Creepage distance			$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Isolation thickness between emitter and detector			$\geq 0.4$	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			$\geq 175$	
Isolation resistance	$V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Storage temperature range		$T_{stg}$	- 55 to + 150	$^{\circ}\text{C}$
Ambient temperature range		$T_{amb}$	- 55 to + 110	$^{\circ}\text{C}$
Soldering temperature <sup>(1)</sup>	2 mm from case, $\leq 10\text{ s}$	$T_{sld}$	260	$^{\circ}\text{C}$
Total power dissipation		$P_{diss}$	220	mW

**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.
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	$I_F = 60\text{ mA}$		$V_F$		1.39	1.65	V
Breakdown voltage	$I_R = 10\text{ }\mu\text{A}$		$V_{BR}$	6			V
Reverse current	$V_R = 6\text{ V}$		$I_R$		0.01	10	$\mu\text{A}$
Capacitance	$V_R = 0\text{ V}, f = 1\text{ MHz}$		$C_O$		25		pF
<b>OUTPUT</b>							
Collector emitter capacitance	$V_{CE} = 5\text{ V}, f = 1\text{ MHz}$		$C_{CE}$		5.2		pF
Base collector capacitance	$V_{CE} = 5\text{ V}, f = 1\text{ MHz}$		$C_{BC}$		6.5		pF
Emitter base capacitance	$V_{CE} = 5\text{ V}, f = 1\text{ MHz}$		$C_{EB}$		7.5		pF
<b>COUPLER</b>							
Collector emitter, saturation voltage	$I_F = 10\text{ mA}, I_C = 2.5\text{ mA}$		$V_{CEsat}$		0.25	0.4	V
Coupling capacitance			$C_C$		0.6		pF
Collector emitter, leakage current	$V_{CE} = 10\text{ V}$	CNY117-1	$I_{CEO}$		2.0	50	nA
		CNY117-2	$I_{CEO}$		2.0	50	nA
		CNY117-3	$I_{CEO}$		5.0	100	nA
		CNY117-4	$I_{CEO}$		5.0	100	nA

**Note**

- Minimum and maximum values were tested requirements. 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.

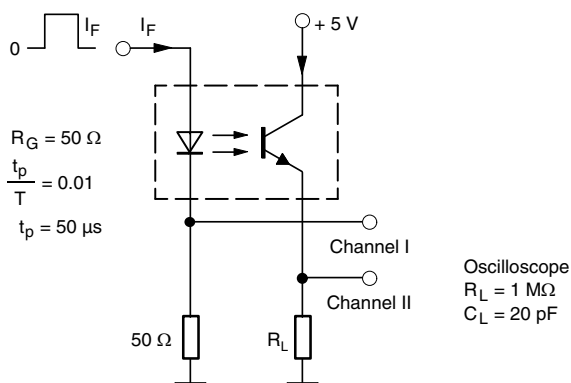


CURRENT TRANSFER RATIO ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio	$I_F = 10\text{ mA}$	CNY117-1	CTR	40		80	%
		CNY117-2	CTR	63		125	%
		CNY117-3	CTR	100		200	%
		CNY117-4	CTR	160		320	%
	$I_F = 1.0\text{ mA}$	CNY117-1	CTR	13	30		%
		CNY117-2	CTR	22	45		%
		CNY117-3	CTR	34	70		%
		CNY117-4	CTR	56	90		%

**Note**

- Current transfer ratio  $I_C/I_F$  at  $V_{CE} = 5.0\text{ V}$ ,  $25\text{ }^{\circ}\text{C}$  and collector emitter leakage current by dash number.

SWITCHING CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
LINEAR OPERATION (without saturation)							
Turn-on time	$I_F = 10\text{ mA}$ , $V_{CC} = 5.0\text{ V}$ , $R_L = 75\text{ }\Omega$		$t_{on}$		3.0		$\mu\text{s}$
Rise time	$I_F = 10\text{ mA}$ , $V_{CC} = 5.0\text{ V}$ , $R_L = 75\text{ }\Omega$		$t_r$		2.0		$\mu\text{s}$
Turn-off time	$I_F = 10\text{ mA}$ , $V_{CC} = 5.0\text{ V}$ , $R_L = 75\text{ }\Omega$		$t_{off}$		2.3		$\mu\text{s}$
Fall time	$I_F = 10\text{ mA}$ , $V_{CC} = 5.0\text{ V}$ , $R_L = 75\text{ }\Omega$		$t_f$		2.0		$\mu\text{s}$
Cut-off frequency	$I_F = 10\text{ mA}$ , $V_{CC} = 5.0\text{ V}$ , $R_L = 75\text{ }\Omega$		$f_{CO}$		110		kHz
SWITCHING OPERATION (with saturation)							
Turn-on time	$I_F = 20\text{ mA}$	CNY117-1	$t_{on}$		3.0		$\mu\text{s}$
	$I_F = 10\text{ mA}$	CNY117-2	$t_{on}$		4.2		$\mu\text{s}$
		CNY117-3	$t_{on}$		4.2		$\mu\text{s}$
		CNY117-4	$t_{on}$		6.0		$\mu\text{s}$
Rise time	$I_F = 20\text{ mA}$	CNY117-1	$t_r$		2.0		$\mu\text{s}$
	$I_F = 10\text{ mA}$	CNY117-2	$t_r$		3.0		$\mu\text{s}$
		CNY117-3	$t_r$		3.0		$\mu\text{s}$
		CNY117-4	$t_r$		4.6		$\mu\text{s}$
Turn-off time	$I_F = 20\text{ mA}$	CNY117-1	$t_{off}$		18		$\mu\text{s}$
	$I_F = 10\text{ mA}$	CNY117-2	$t_{off}$		23		$\mu\text{s}$
		CNY117-3	$t_{off}$		23		$\mu\text{s}$
		CNY117-4	$t_{off}$		25		$\mu\text{s}$
Fall time	$I_F = 20\text{ mA}$	CNY117-1	$t_f$		11		$\mu\text{s}$
	$I_F = 10\text{ mA}$	CNY117-2	$t_f$		14		$\mu\text{s}$
		CNY117-3	$t_f$		14		$\mu\text{s}$
		CNY117-4	$t_f$		15		$\mu\text{s}$



95 10804-3

Fig. 1 - Test Circuit, Non-Saturated Operation

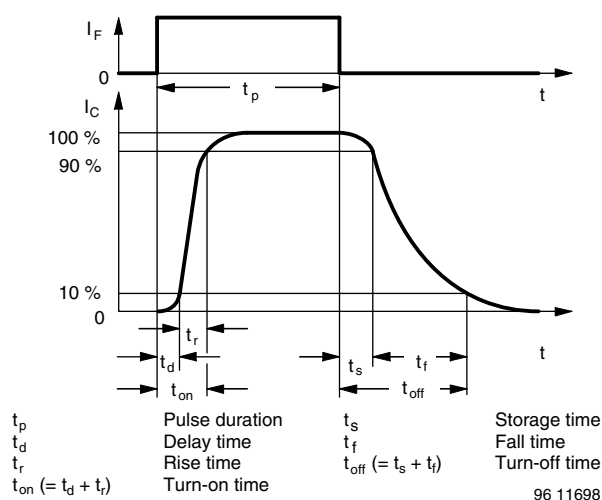
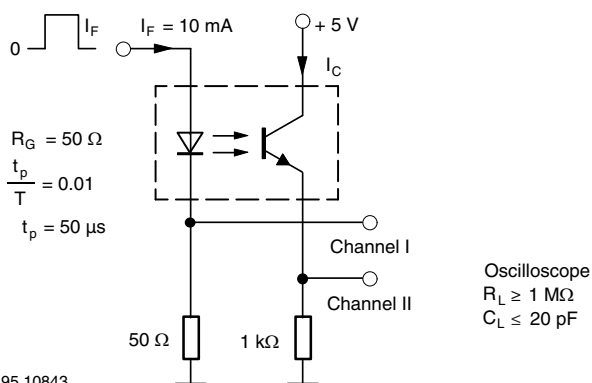


Fig. 3 - Switching Times

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95 10843

Fig. 2 - Test Circuit, Saturated Operation

## TYPICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

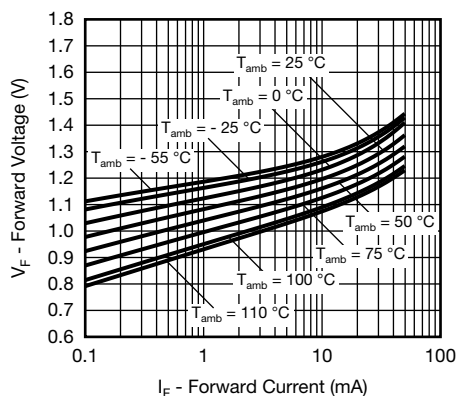


Fig. 4 - Forward Voltage vs. Forward Current

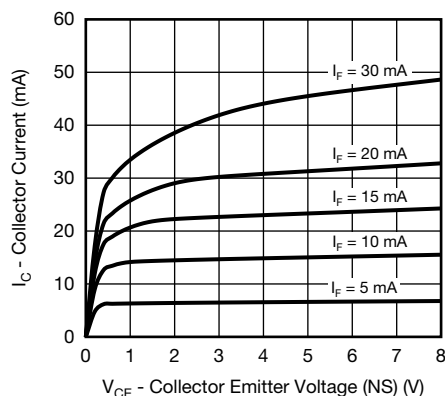


Fig. 5 - Collector Current vs. Collector Emitter Voltage (NS)

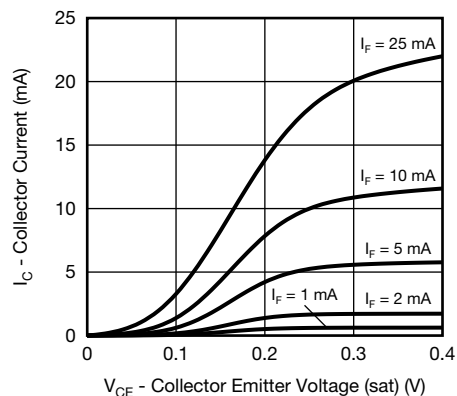


Fig. 6 - Collector Current vs. Collector Emitter Voltage (sat)

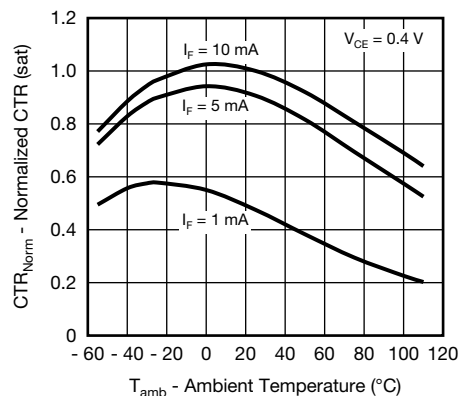


Fig. 9 - Normalized CTR (sat) vs. Ambient Temperature

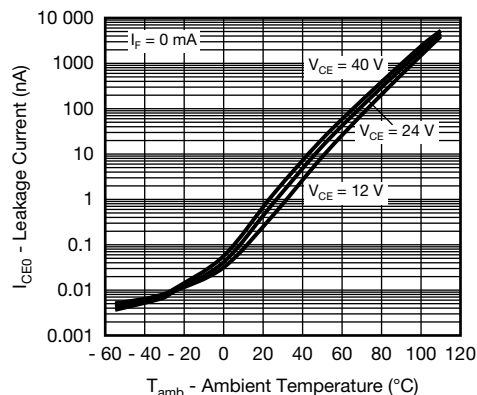


Fig. 7 - Leakage Current vs. Ambient Temperature

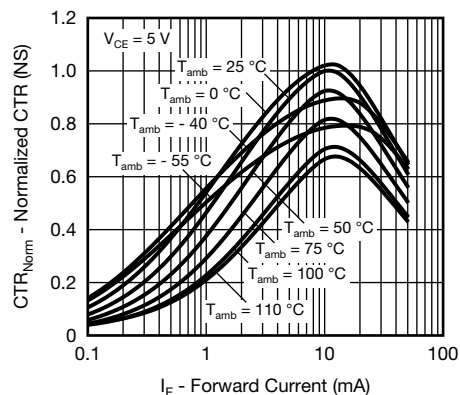


Fig. 10 - Normalized CTR (NS) vs. Forward Current

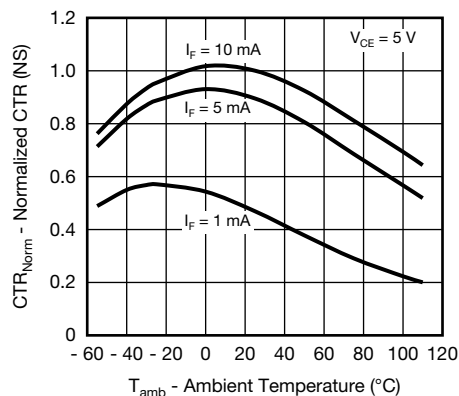


Fig. 8 - Normalized CTR (NS) vs. Ambient Temperature

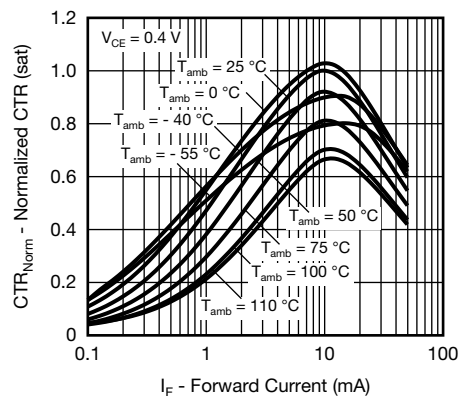


Fig. 11 - Normalized CTR (sat) vs. Forward Current

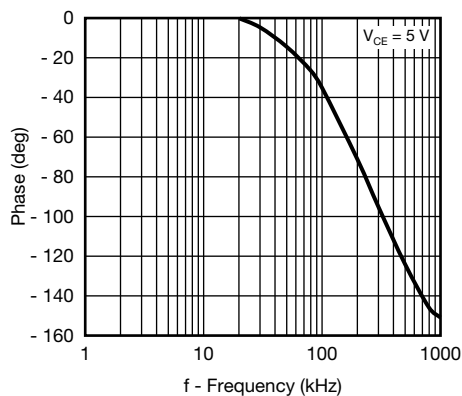


Fig. 12 - CTR Frequency vs. Phase Angle

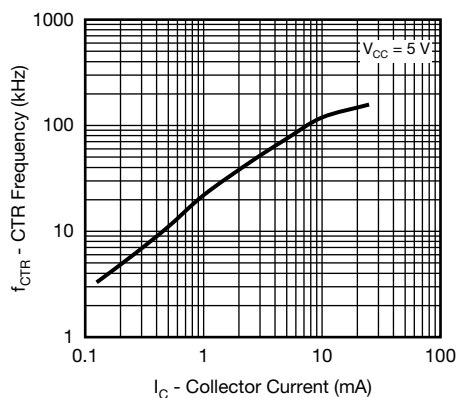


Fig. 13 - CTR Frequency vs. Collector Current

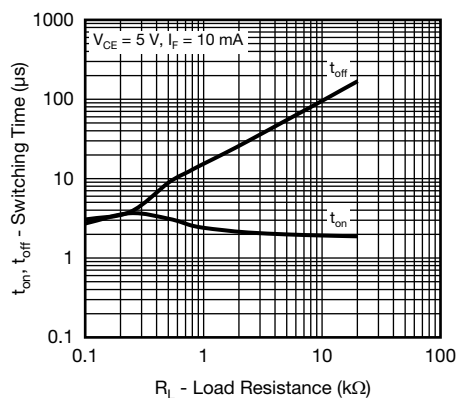
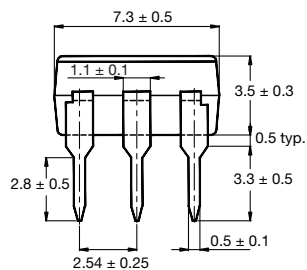
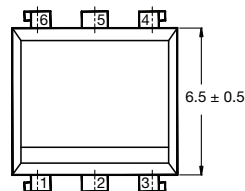
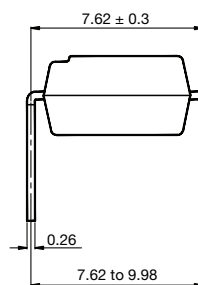
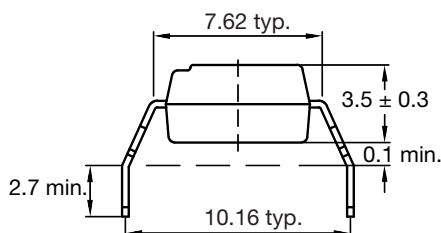


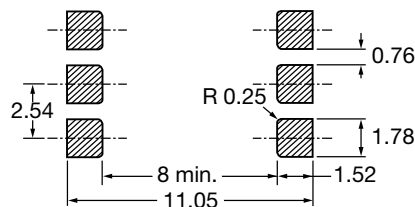
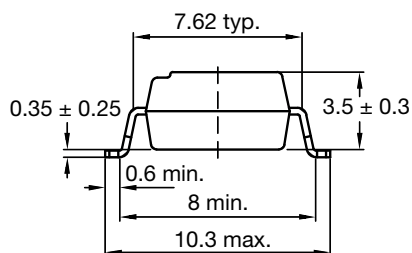
Fig. 14 - Switching Time vs. Load Resistance

**PACKAGE DIMENSIONS** in millimeters


22530

**Option 6**

**Option 7**


20802-35


**PACKAGE MARKING**

**Notes**

- VDE logo is only marked on option 1 parts. Option information is not marked on the part.
- Tape and reel suffix (T) is not part of the package marking.

**TUBE AND TAPE INFORMATION**

DEVICES PER TUBE			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
DIP-6	50	40	2000

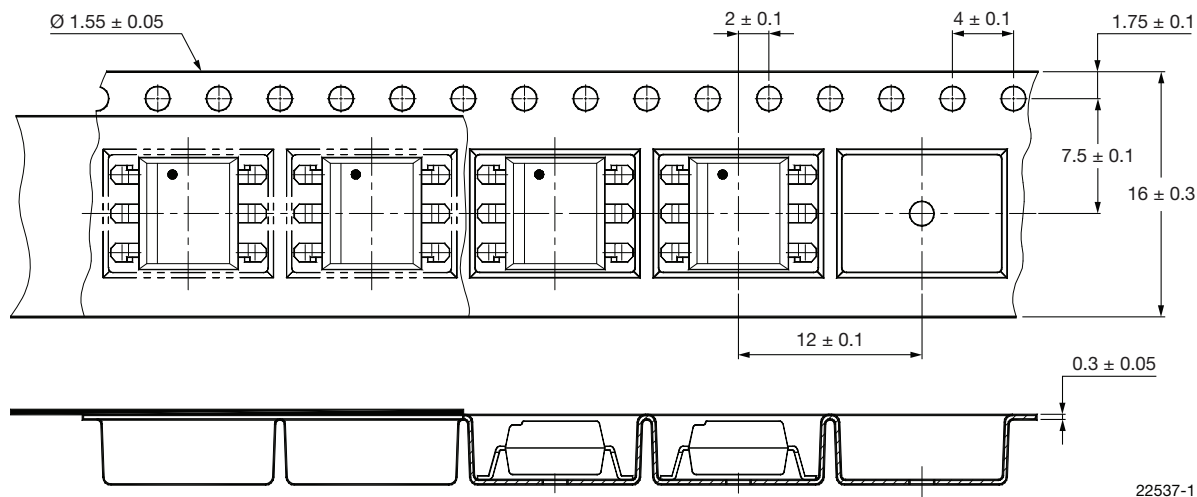


Fig. 15 - Tape and Reel Drawing, 1000 Units per Reel





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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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