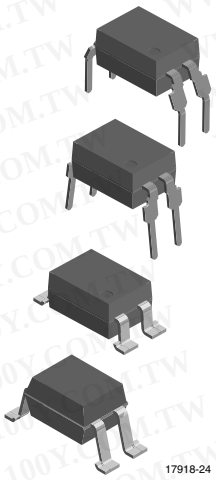
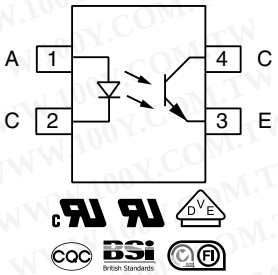
Optocoupler, Phototransistor Output, High Reliability, 5300 V_{RMS}





FEATURES

- Operating temperature from -55 °C to +110 °C
- Good CTR linearity depending on forward current
- Isolation test voltage, 5300 V_{RMS}
- High collector emitter voltage, V_{CEO} = 80 V
- Low saturation voltage
- Fast switching times
- Low CTR degradation
- Temperature stable
- Low coupling capacitance
- End stackable, 0.100" (2.54 mm) spacing
- High common mode interference 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 110 °C rated VO617A feature a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 package.

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

The couplers are end-stackable with 2.54 mm spacing.

Creepage and clearance distances of > 8.0 mm are achieved with option 6. This version complies with IEC 60950 (DIN VDE 0805) for reinforced insulation up to an operation voltage of 400 V_{RMS} or DC. Specifications subject to change.

APPLICATIONS

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

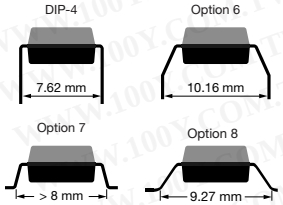
AGENCY APPROVALS

Safety application model number covering all products in this data sheet is VO617A. This model number should be used when consulting safety agency documents.

- UL1577, file no. E52744
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- BSI IEC 60950; IEC 60065
- FIMKO EN 60065, EN 60950-1
- CQC GB8898-2011

ORDERING INFORMATION

V	O	6	1	7	A	-	#	X	0	#	#	T
PART NUMBER							CTR BIN	PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	CTR (%) 5 mA							
UL, cUL, BSI, FIMKO	**50 to 600**	**40 to 80**	**63 to 125**	**100 to 200**	**160 to 320**	**80 to 160**	**130 to 260**	**200 to 400**
DIP-4	VO617A	VO617A-1	VO617A-2	VO617A-3	VO617A-4	VO617A-7	VO617A-8	VO617A-9
DIP-4, 400 mil, option 6	-	-	-	VO617A-3X006	VO617A-4X006	-	-	-
SMD-4, option 7	-	-	VO617A-2X007T	VO617A-3X007T	VO617A-4X007T	-	-	-
VDE, UL, cUL, BSI, FIMKO	**50 to 600**	**40 to 80**	**63 to 125**	**100 to 200**	**160 to 320**	**80 to 160**	**130 to 260**	**200 to 400**
DIP-4, 400 mil, option 6	-	-	-	VO617A-3X016	VO617A-4X016	VO617A-7X016	VO617A-8X016	VO617A-9X016
SMD-4, option 7	-	VO617A-1X017T	VO617A-2X017T	VO617A-3X017T	VO617A-4X017T	VO617A-7X017T	VO617A-8X017T	VO617A-9X017T
SMD-4, 400 mil, option 8	-	-	-	VO617A-3X018T	-	-	-	-

Note

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

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	6	V
Forward current		I_F	60	mA
Forward surge current	$t_p \leq 10$ µs	I_{FSM}	1.5	A
LED power dissipation		P_{diss}	70	mW
OUTPUT				
Collector emitter voltage		V_{CEO}	80	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
Collector peak current	$t_p/T = 0.5$, $t_p \leq 10$ ms	I_{CM}	100	mA
Ouput power dissipation		P_{diss}	150	mW
COUPLER				
Total power dissipation		P_{tot}	200	mW
Operation temperature		T_{amb}	-55 to +110	°C
Storage temperature range		T_{stg}	-55 to +150	°C
Soldering temperature	2 mm from case, ≤ 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.

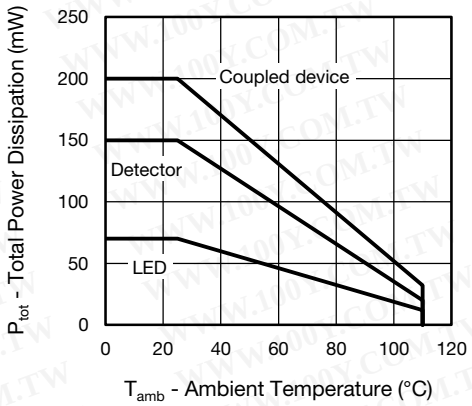


Fig. 1 - Total Power Dissipation vs. Ambient Temperature

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 60 mA		V_F	1	1.35	1.65	V
Reverse current	V_R = 6 V		I_R		0.01	10	µA
Junction capacitance	V_R = 0 V, f = 1 MHz		C_j		13		pF
OUTPUT							
Collector emitter leakage current	V_{CE} = 10 V	VO617A-1	I_{CEO}		2	50	nA
		VO617A-2			2	50	
		VO617A-3			5	100	
		VO617A-4			5	100	
		VO617A-7			5	100	
		VO617A-8			5	100	
		VO617A-9			5	100	
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CE}		5.2		pF
Collector emitter breakdown voltage	I_C = 1 mA		BV_{CEO}	80			V
Emitter collector breakdown voltage	I_E = 100 µA		BV_{ECO}	7			V
COUPLER							
Collector emitter saturation voltage	I_F = 5 mA, I_C = 1.0 mA		V_{CEsat}		0.25	0.4	V
Coupling capacitance	f = 1 MHz		C_C		0.4		pF

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 = 5 mA, V_{CE} = 5 V	VO617A	CTR	50		600	%
		VO617A-1	CTR	40		80	%
		VO617A-2	CTR	63		125	%
		VO617A-3	CTR	100		200	%
		VO617A-4	CTR	160		320	%
		VO617A-7	CTR	80		160	%
		VO617A-8	CTR	130		260	%
		VO617A-9	CTR	200		400	%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**CTR BIN**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
NON-SATURATED							
Rise and fall time	I_F = 5 mA, V_{CC} = 5 V, R_L = 75 Ω		t_r, t_f		2		µs
Turn-on time	I_F = 5 mA, V_{CC} = 5 V, R_L = 75 Ω		t_{on}		3		µs
Turn-off time			t_{off}		2.3		µs
Cut-off frequency	I_F = 5 mA, V_{CC} = 5 V, R_L = 75 Ω		f_{ctr}		190		kHz
SATURATED							
Turn-on time	I_F = 5 mA		t_{on}		6		µs
Turn-off time	I_F = 5 mA		t_{off}		25		µs
Rise time	I_F = 5 mA		t_r		4.6		µs
Fall time	I_F = 5 mA		t_f		15		µs

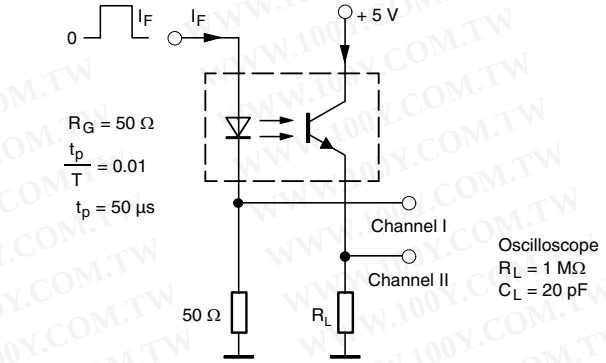


Fig. 2 - Test Circuit, Non-Saturated Operation

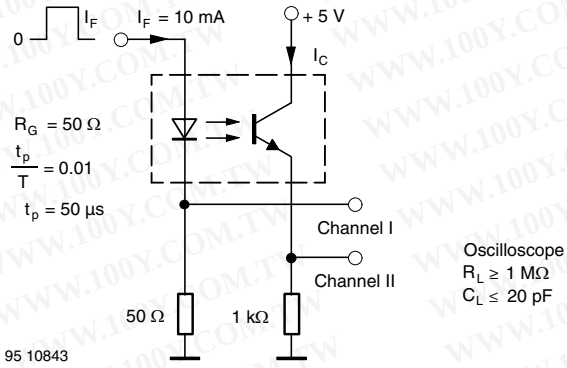


Fig. 3 - Test Circuit, Saturated Operation

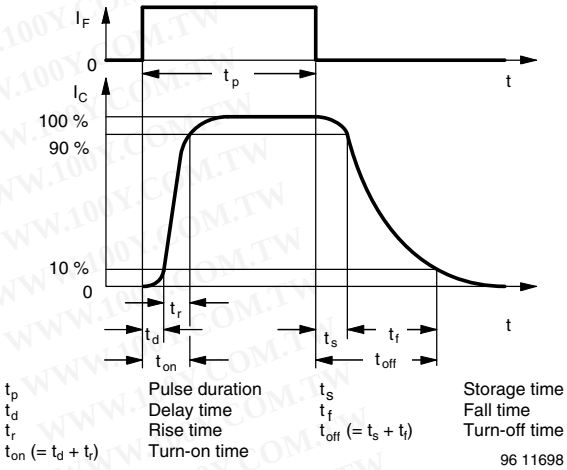


Fig. 4 - Switching Times

SAFETY AND INSULATION RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Climatic classification	According to IEC 68 part 1		55/115/21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group IIIa	CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, t = 1 min	V_{ISO}	4470	V_{RMS}
Tested withstanding isolation voltage	According to UL1577, t = 1 s	V_{ISO}	5300	V_{RMS}
Maximum transient isolation voltage	According to DIN EN 60747-5-5	V_{IOTM}	8000	V_{peak}
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	V_{IORM}	890	V_{peak}
Isolation resistance	T_{amb} = 25 °C, V_{IO} = 500 V	R_{IO}	$\geq 10^{12}$	Ω
	T_{amb} = 100 °C, V_{IO} = 500 V	R_{IO}	$\geq 10^{11}$	Ω
Output safety power		P_{SO}	700	mW
Input safety current		I_{SI}	400	mA
Input safety temperature		T_S	175	°C
Creepage distance	DIP-4		≥ 7	mm
Clearance distance	DIP-4		≥ 7	mm
Creepage distance	DIP-4, 400 mil, option 6		≥ 8	mm
Clearance distance	DIP-4, 400 mil, option 6		≥ 8	mm
Creepage distance	SMD-4, option 7		≥ 7	mm
Clearance distance	SMD-4, option 7		≥ 7	mm
Creepage distance	SMD-4, 400 mil, option 8		≥ 8	mm
Clearance distance	SMD-4, 400 mil, option 8		≥ 8	mm
Insulation thickness		DTI	≥ 0.4	mm

Note

- As per DIN EN 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)

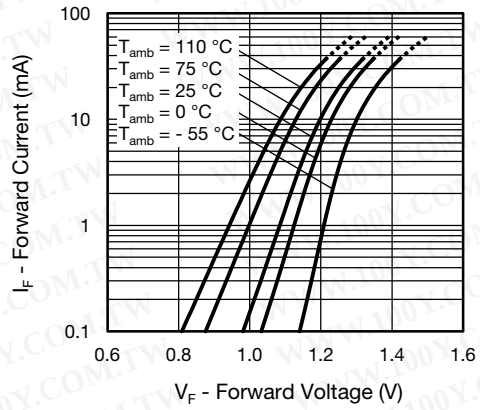


Fig. 5 - Forward Voltage vs. Forward Current

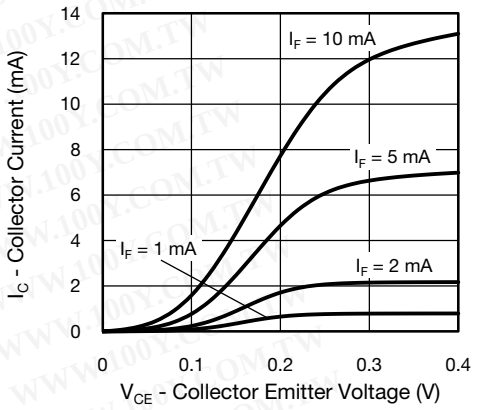


Fig. 8 - Collector Current vs. Collector Emitter Voltage

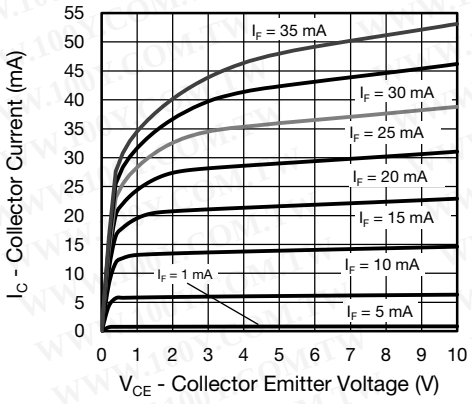


Fig. 6 - Collector Current vs. Collector Emitter Voltage

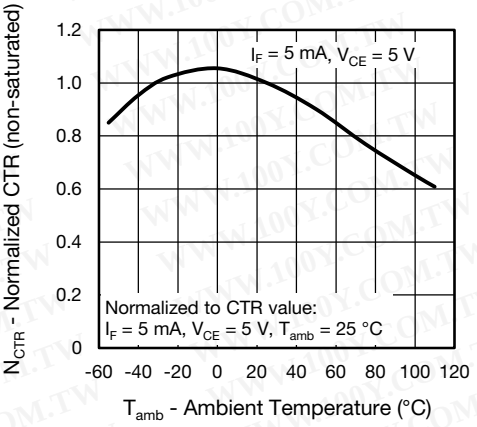


Fig. 9 - Normalized Current Transfer Ratio (non-sat.) vs. Ambient Temperature

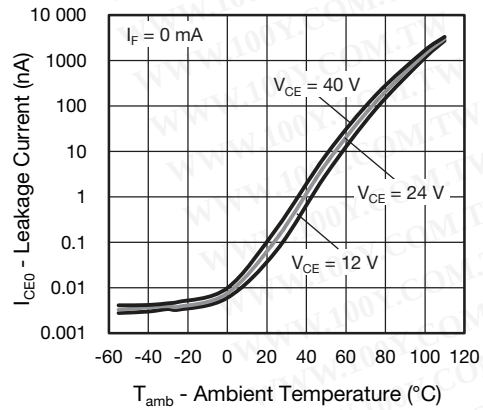


Fig. 7 - Leakage Current vs. Ambient Temperature

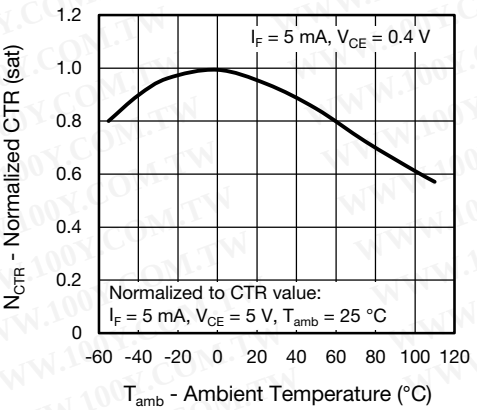


Fig. 10 - Normalized Current Transfer Ratio (sat.) vs. Ambient Temperature

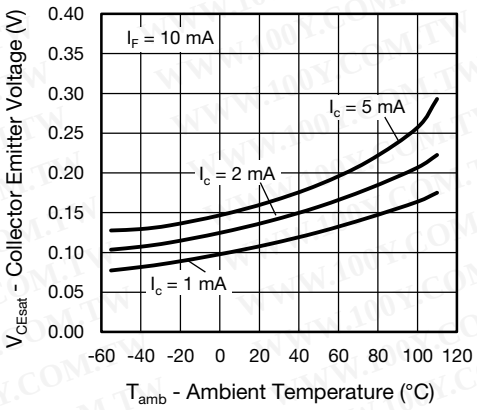


Fig. 11 - Collector Emitter Voltage vs. Ambient Temperature

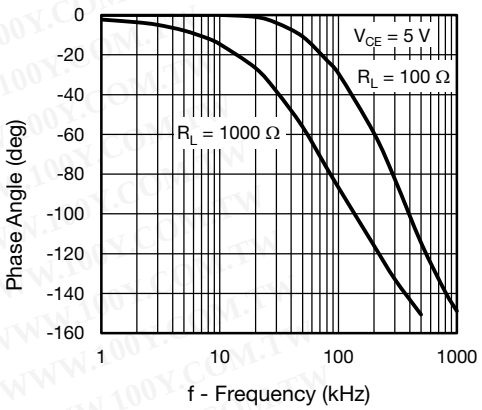


Fig. 14 - Phase Angle vs. Frequency

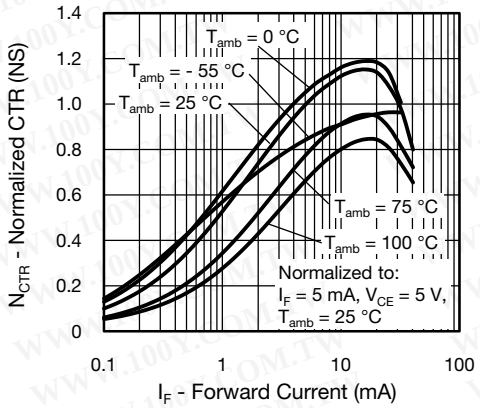


Fig. 12 - Normalized CTR (non-sat.) vs. Forward Current

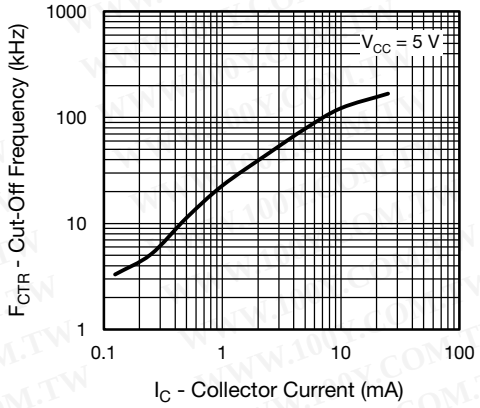


Fig. 15 - Cut-Off Frequency vs. Collector Current

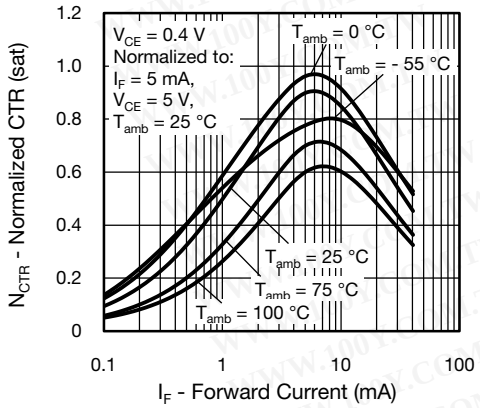


Fig. 13 - Normalized CTR (sat.) vs. Forward Current

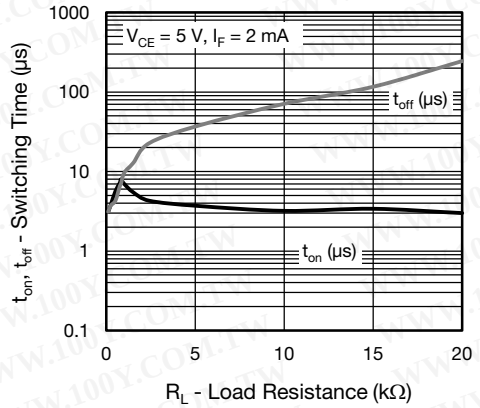


Fig. 16 - Switching Time vs. Load Resistance

PACKAGE DIMENSIONS (in millimeters)

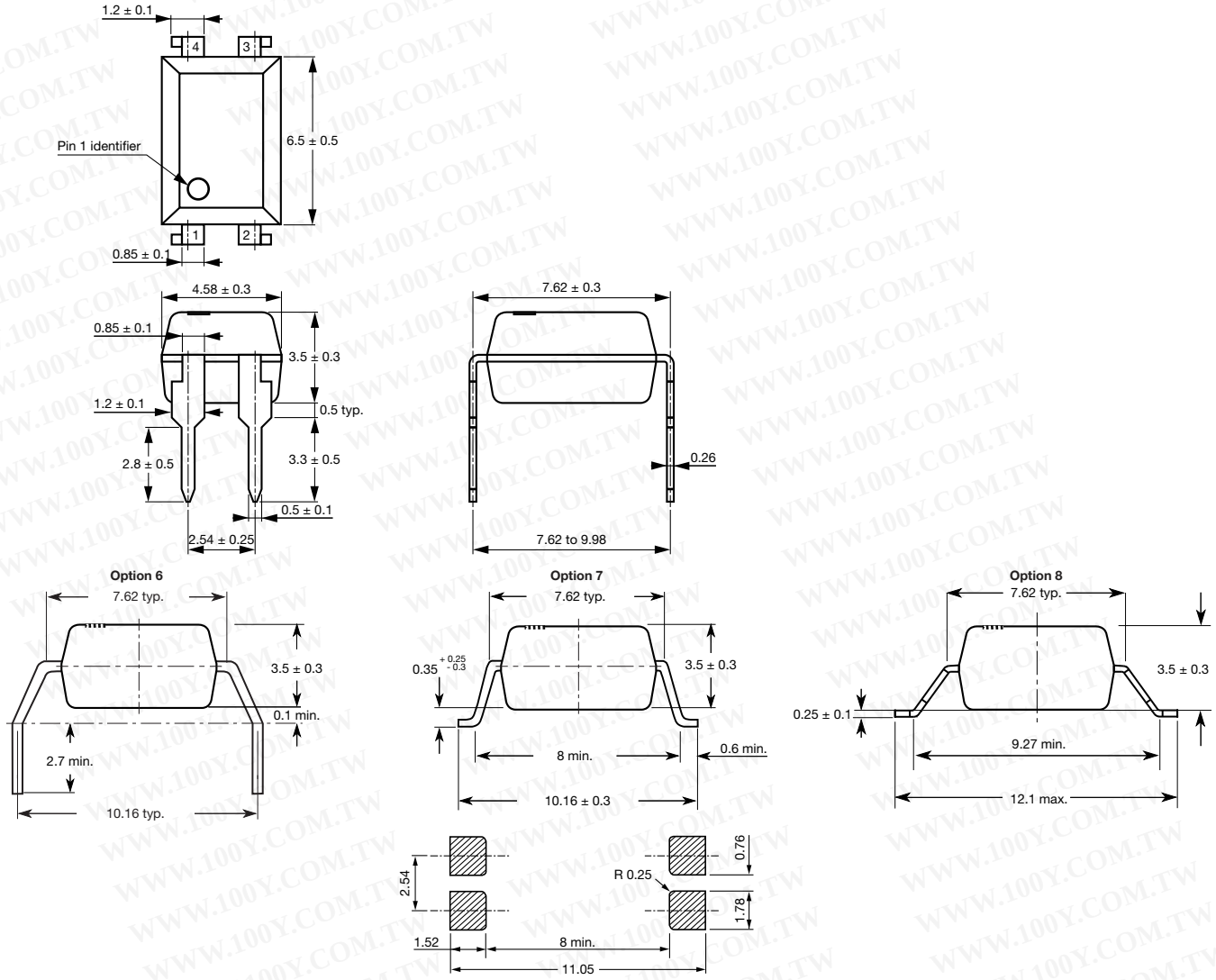


Fig. 17 - Package Drawings

PACKAGE MARKING

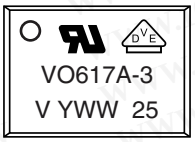


Fig. 18 - Example of VO617A-3X017T

Notes

- The 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.

PACKING INFORMATION

DEVICE PER TUBE			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
DIP-4	100	40	4000

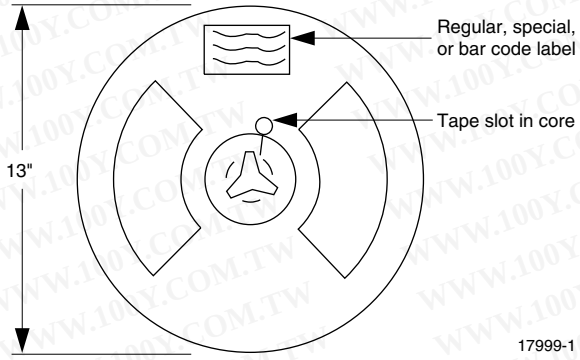


Fig. 19 - Tape and Reel Shipping Medium

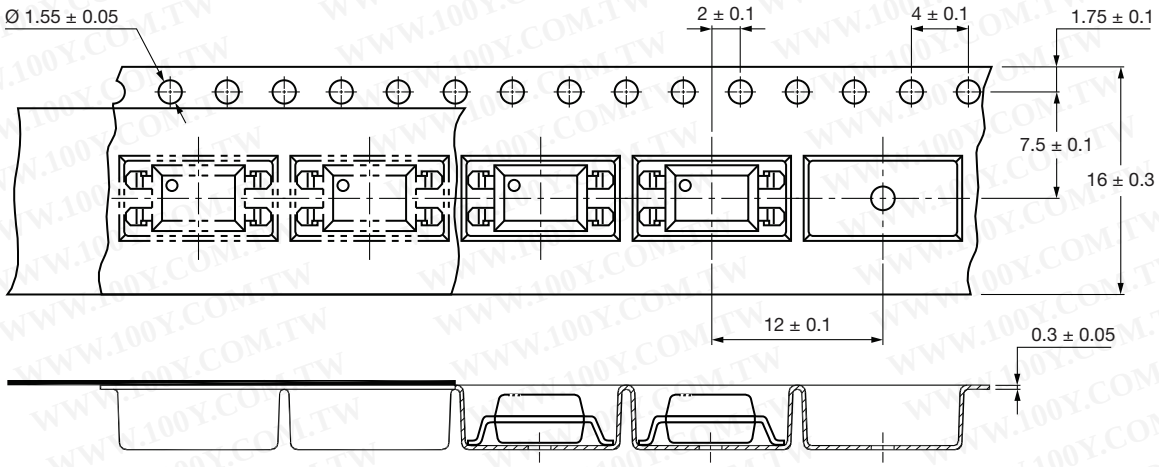


Fig. 20 - Tape and Packing for Option 7 (1000 units per reel)

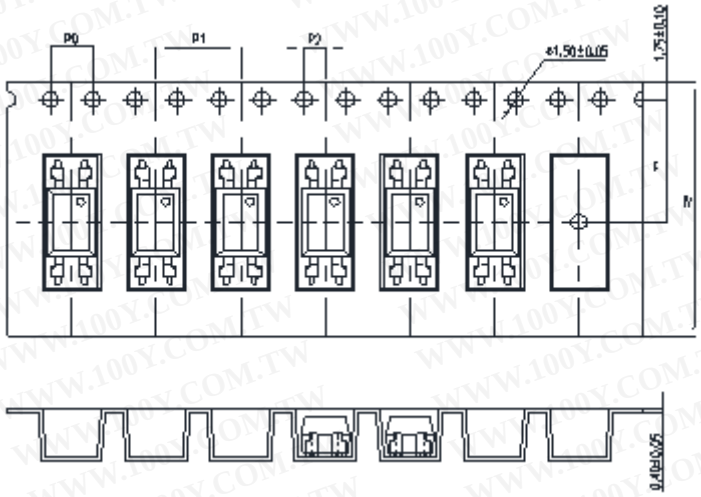


Fig. 21 - Tape and Reel Packaging for Option 8 (2000 units per reel)

SOLDER PROFILES

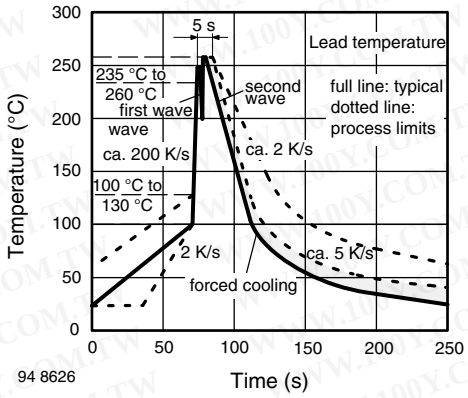


Fig. 22 - Wave Soldering Double Wave Profile According to J-STD-020 for DIP-8 Devices

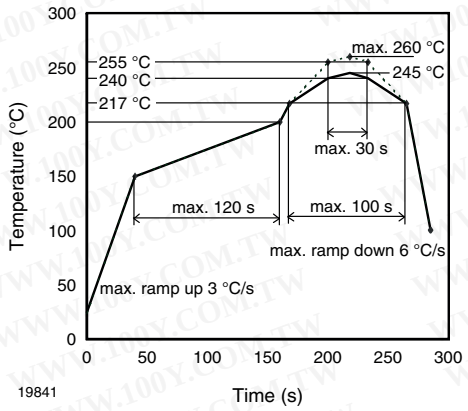


Fig. 23 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD-8 Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: T_{amb} < 30 °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020

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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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