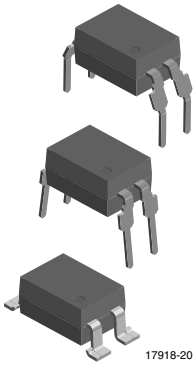
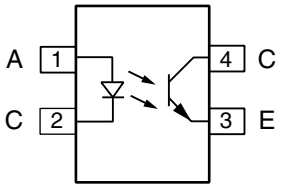
Optocoupler, Phototransistor Output, High Reliability, 5000 V_{RMS}, 110 °C Rated





FEATURES

- Operating temperature from -55 °C to +110 °C
- Good CTR linearity depending on forward current
- Isolation test voltage, 5000 V_{RMS}
- High collector emitter voltage, V_{CEO} = 70 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)

LINKS TO ADDITIONAL RESOURCES

Related Documents
SPICE Models

DESCRIPTION

The 110 °C rated SFH1617A (DIP) 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

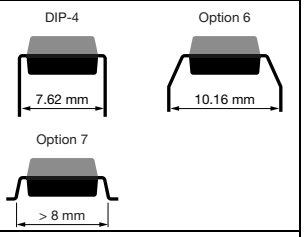
- AC adapter
- SMPS
- PLC
- Factory automation
- Game consoles

AGENCY APPROVALS

- UL
- cUL
- DIN EN 60747-5-5 (VDE 0884-5) available with option 1
- BSI
- FIMKO
- CQC

ORDERING INFORMATION

S	F	H	1	6	1	7	A	-	#	X	0	#	#	T
PART NUMBER									CTR BIN	PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED / PACKAGE	CTR (%)	
UL, cUL, BSI, FIMKO, CQC	**63 to 125**	**100 to 200**
DIP-4	SFH1617A-2	SFH1617A-3
VDE, UL, cUL, BSI, FIMKO, CQC (option 1)	**63 to 125**	**100 to 200**
DIP-4, 400 mil, option 6	-	SFH1617A-3X016
SMD-4, option 7	SFH1617A-2X017T	-

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	6.0	V
DC forward current		I_F	60	mA
Surge forward current	t ≤ 10 µs	I_{FSM}	2.5	A
LED power dissipation		P_{diss}	70	mW
OUTPUT				
Collector emitter voltage		V_{CEO}	70	V
Emitter collector voltage		V_{ECO}	7.0	V
Collector current		I_C	50	mA
Collector peak current	t_p/T = 0.5, t_p ≤ 10 ms	I_{CM}	100	mA
Output power dissipation		P_{diss}	150	mW
COUPLER				
Storage temperature range		T_{stg}	-55 to +150	°C
Ambient temperature range		T_{amb}	-55 to +110	°C
Soldering temperature [1]	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

(1) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP)

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	-	1.35	1.65	V
Reverse current	V_R = 6.0 V		I_R	-	0.01	10	µA
Capacitance	V_R = 0 V, f = 1.0 MHz		C_O	-	13	-	pF
OUTPUT							
Collector emitter capacitance	V_{CE} = 5.0 V, f = 1.0 MHz		C_{CE}	-	5.2	-	pF
Collector emitter leakage current	V_{CE} = 10 V	SFH1617A-1	I_{CEO}	-	2.0	50	nA
		SFH1617A-2	I_{CEO}	-	2.0	50	nA
		SFH1617A-3	I_{CEO}	-	5.0	100	nA
		SFH1617A-4	I_{CEO}	-	5.0	100	nA
COUPLER							
Collector emitter saturation voltage	I_F = 10 mA, I_C = 2.5 mA		V_{CEsat}	-	0.25	0.4	V
Coupling capacitance			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

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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} = 5.0 V	SFH1617A-1	CTR	40	-	80	%
		SFH1617A-2	CTR	63	-	125	%
		SFH1617A-3	CTR	100	-	200	%
		SFH1617A-4	CTR	160	-	320	%
	I_F = 1.0 mA, V_{CE} = 5.0 V	SFH1617A-1	CTR	13	30	-	%
		SFH1617A-2	CTR	22	45	-	%
		SFH1617A-3	CTR	34	70	-	%
		SFH1617A-4	CTR	56	90	-	%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
NON-SATURATED							
Turn-on time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω		t_{on}	-	3.0	-	µs
Rise time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω		t_r	-	2.0	-	µs
Turn-off time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω		t_{off}	-	2.3	-	µs
Fall time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω		t_f	-	2.0	-	µs
Cut-off frequency	I_F = 10 mA, V_{CC} = 5.0 V		f_{ctr}	-	100	-	kHz
SATURATED							
Turn-on time	I_F = 20 mA	SFH1617A-1	t_{on}	-	3.0	-	µs
	I_F = 10 mA	SFH1617A-2	t_{on}	-	4.2	-	µs
		SFH1617A-3	t_{on}	-	4.2	-	µs
	I_F = 5.0 mA	SFH1617A-4	t_{on}	-	6.0	-	µs
Rise time	I_F = 20 mA	SFH1617A-1	t_r	-	2.0	-	µs
	I_F = 10 mA	SFH1617A-2	t_r	-	3.0	-	µs
		SFH1617A-3	t_r	-	3.0	-	µs
	I_F = 5.0 mA	SFH1617A-4	t_r	-	4.6	-	µs
Turn-off time	I_F = 20 mA	SFH1617A-1	t_{off}	-	18	-	µs
	I_F = 10 mA	SFH1617A-2	t_{off}	-	23	-	µs
		SFH1617A-3	t_{off}	-	23	-	µs
	I_F = 5.0 mA	SFH1617A-4	t_{off}	-	25	-	µs
Fall time	I_F = 20 mA	SFH1617A-1	t_f	-	11	-	µs
	I_F = 10 mA	SFH1617A-2	t_f	-	14	-	µs
		SFH1617A-3	t_f	-	14	-	µs
	I_F = 5.0 mA	SFH1617A-4	t_f	-	15	-	µs

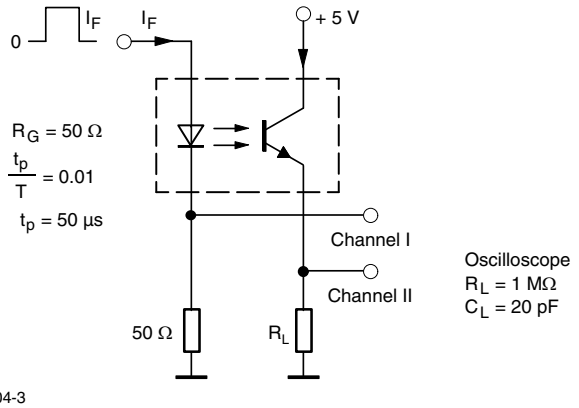


Fig. 1 - Test Circuit, Non-Saturated Operation

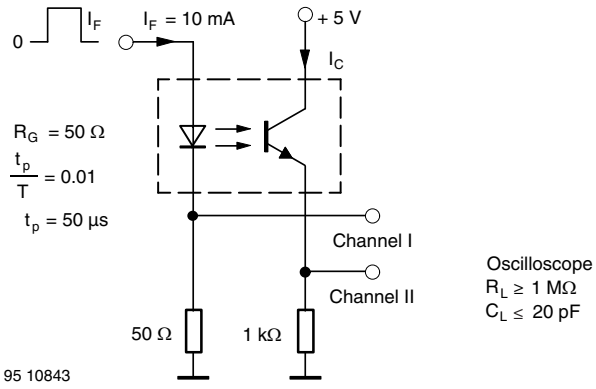


Fig. 2 - Test Circuit, Saturated Operation

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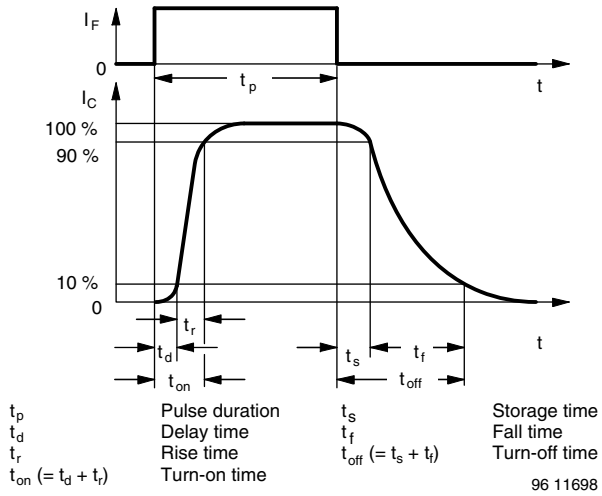


Fig. 3 - Switching Times

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}	≥ 10^{12}	Ω
	T_{amb} = 100 °C, V_{IO} = 500 V	R_{IO}	≥ 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 and option 9		≥ 7	mm
Clearance distance	SMD-4, option 7 and option 9		≥ 7	mm
Insulation thickness		DTI	≥ 0.4	mm

Note

- As per DIN EN 60747-5-5, 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.

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

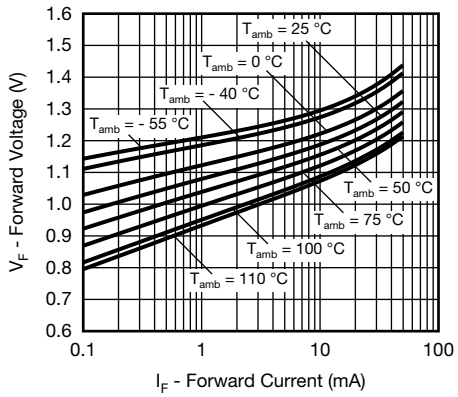


Fig. 4 - Forward Voltage vs. Forward Current

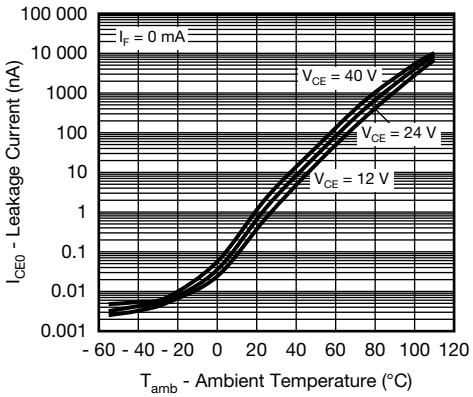


Fig. 7 - Leakage Current vs. Ambient Temperature

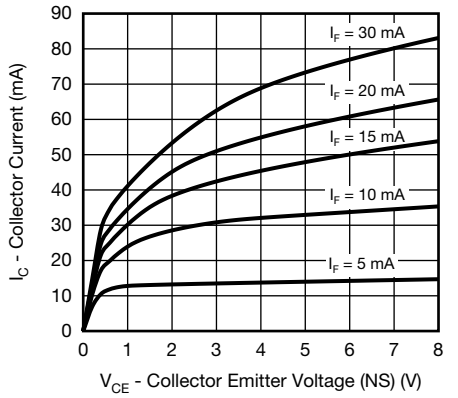


Fig. 5 - Collector Current vs. Collector Emitter Voltage (NS)

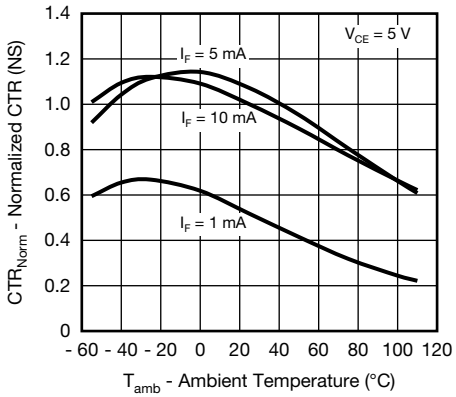


Fig. 8 - Normalized CTR (NS) vs. Ambient Temperature

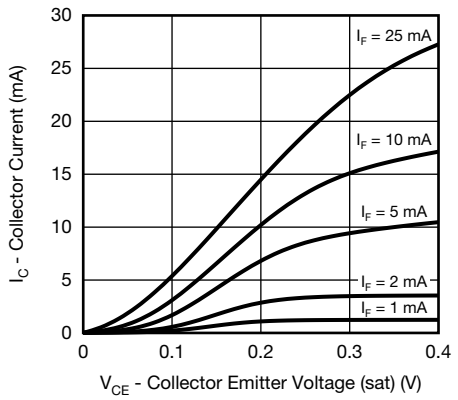


Fig. 6 - Collector Current vs. Collector Emitter Voltage (sat)

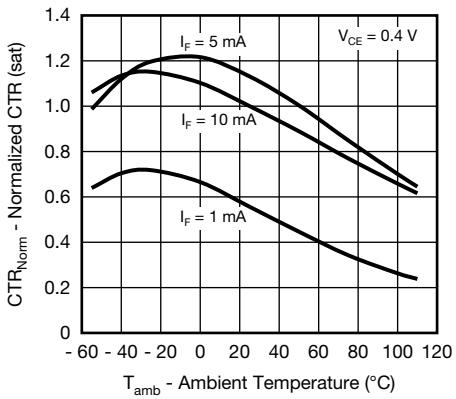


Fig. 9 - Normalized CTR (sat) vs. Ambient Temperature

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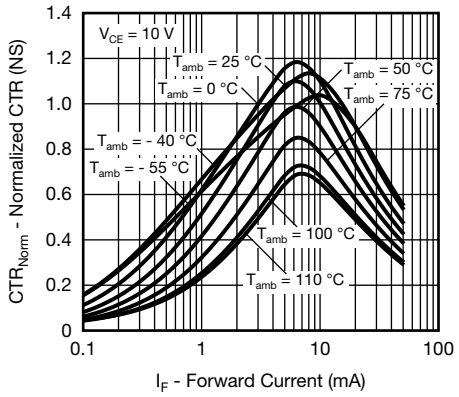


Fig. 10 - Normalized CTR (NS) vs. Forward Current

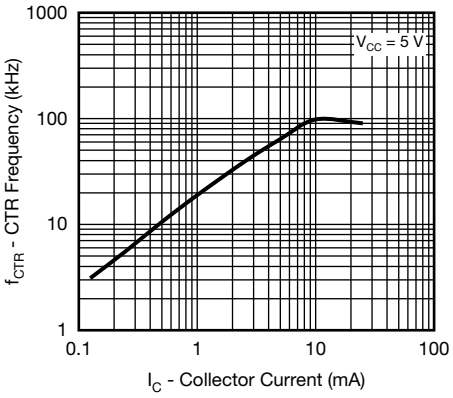


Fig. 13 - CTR Frequency vs. Collector Current

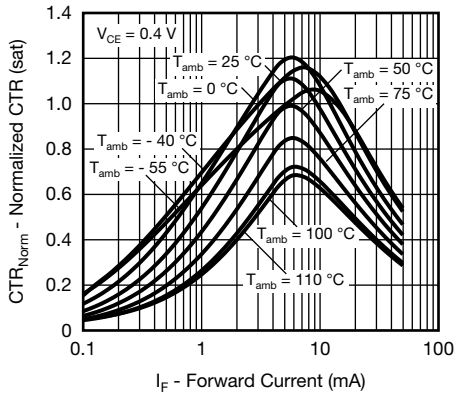


Fig. 11 - Normalized CTR (sat) vs. Forward Current

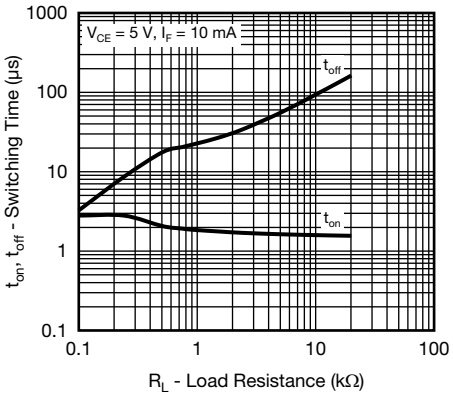


Fig. 14 - Switching Time vs. Load Resistance

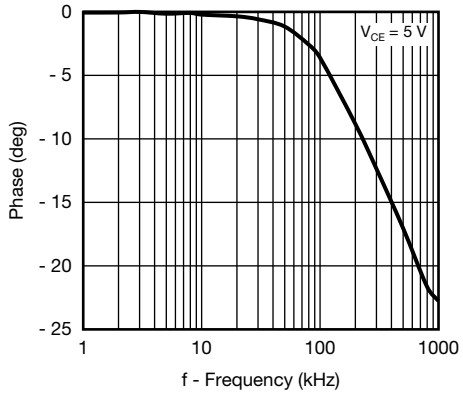
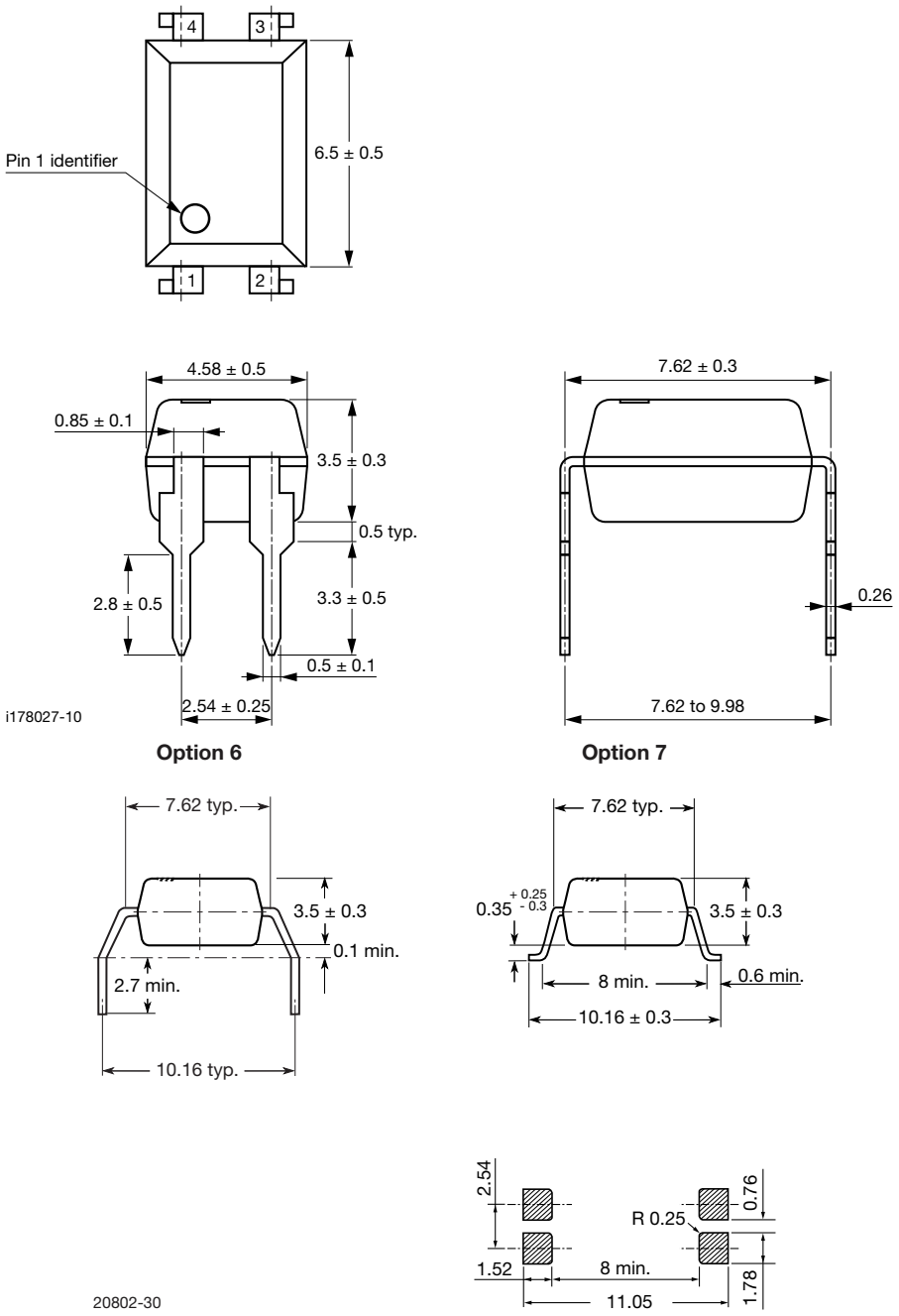


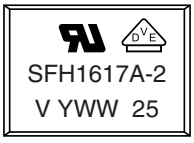
Fig. 12 - CTR Frequency vs. Phase Angle

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PACKAGE DIMENISONS in millimeters



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

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