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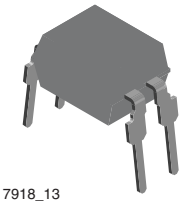
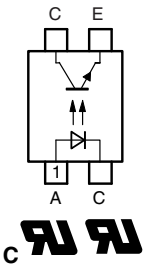
Optocoupler, Phototransistor Output



17918_13



17203-5

FEATURES

- Endstackable to 2.54 mm (0.1") spacing
- DC isolation test voltage 5000 V_{RMS}
- Current transfer ratio (CTR) selected into groups
- Low temperature coefficient of CTR
- Wide ambient temperature range
- Available in single, dual and quad channel packages
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

In the K817P part each channel consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4 pin (single) plastic dual inline package.

AGENCY APPROVALS

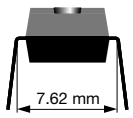
- BSI: EN 60065:2002, EN 60950-1:2006
- DIN EN 60747-5-2 (VDE 0884)
- FIMKO
- UL file no. E52744
- cUL tested to CSA 22.2 bulletin 5A

APPLICATIONS

- Programmable logic controllers
- Modems
- Answering machines
- General applications

ORDERING INFORMATION

K	8	1	7	P	#	x
PART NUMBER						PACKAGE OPTION



AGENCY CERTIFIED/ PACKAGE	CTR (%)									
	5 mA	10 mA				5 mA				
VDE, BSI, FIMKO, UL, cUL	50 to 600	40 to 80	63 to 125	100 to 200	160 to 320	50 to 150	100 to 300	80 to 160	130 to 260	200 to 400
DIP-4	K817P	K817P1	K817P2	K817P3	K817P4	K817P5	K817P6	K817P7	K817P8	K817P9

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	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
Power dissipation		P_{diss}	70	mW
Junction temperature		T_j	125	°C
OUTPUT				
Collector emitter voltage		V_{CEO}	70	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
Power dissipation		P_{diss}	70	mW
Junction temperature		T_j	125	°C

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
COUPLER				
AC isolation test voltage (RMS)	t = 1 s	V_{ISO}	5000	V_{RMS}
Total power dissipation		P_{tot}	200	mW
Operating ambient temperature range		T_{amb}	- 40 to + 100	°C
Storage temperature range		T_{stg}	- 55 to + 125	°C
Soldering temperature (1)	2 mm from case, 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 wave profile for soldering conditions for through hole devices.

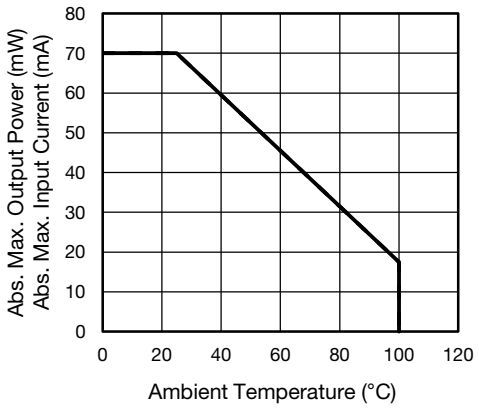


Fig. 1 - Absolute Maximum Output Power and Input Current vs. Ambient Temperature

ELECTRICAL CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 50 mA	V_F		1.25	1.6	V
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j		50		pF
OUTPUT						
Collector emitter voltage	I_C = 100 µA	V_{CEO}	70			V
Emitter collector voltage	I_E = 100 µA	V_{ECO}	7			V
Collector dark current	V_{CE} = 20 V, I_F = 0, E = 0	I_{CEO}		10	100	nA
COUPLER						
Collector emitter saturation voltage	I_F = 10 mA, I_C = 1 mA	V_{CEsat}			0.3	V
Cut-off frequency	I_F = 10 mA, V_{CE} = 5 V, R_L = 100 Ω	f_c		110		kHz
Coupling capacitance	f = 1 MHz	C_k		0.6		pF

Note

T_{amb} = 25 °C, unless otherwise specified.
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							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	V_{CE} = 5 V, I_F = 5 mA	K817P	CTR	50		600	%
	V_{CE} = 5 V, I_F = 10 mA	K817P1	CTR	40		80	%
		K817P2	CTR	63		125	%
		K817P3	CTR	100		200	%
		K817P4	CTR	160		320	%
	V_{CE} = 5 V, I_F = 5 mA	K817P5	CTR	50		150	%
		K817P6	CTR	100		300	%
		K817P7	CTR	80		160	%
		K817P8	CTR	130		260	%
		K817P9	CTR	200		400	%

SAFETY AND INSULATION RATED PARAMETERS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Partial discharge test voltage - routine test	100 %, t_{test} = 1 s	V_{pd}	1.6			kV
Partial discharge test voltage - lot test (sample test)	t_{Tr} = 60 s, t_{test} = 10 s, (see figure 2)	V_{pd}	1.36			kV
Insulation resistance	V_{IO} = 500 V	R_{IO}	10^{12}			Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	10^{11}			Ω
	V_{IO} = 500 V, T_{amb} = 150 °C (construction test only)	R_{IO}	10^{9}			Ω
Rated impulse voltage		V_{IOTM}			6000	V_{peak}
Max. working voltages	Recurring peak voltage	V_{IORM}			850	V_{peak}
Forward current		I_{SI}			130	mA
Power dissipation		P_{SO}			265	mW
Safety temperature		T_{si}			150	°C
Creepage distance					7.6	mm

Note

- According to DIN EN 60747-5-5 (VDE 0884) (see figure 2). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

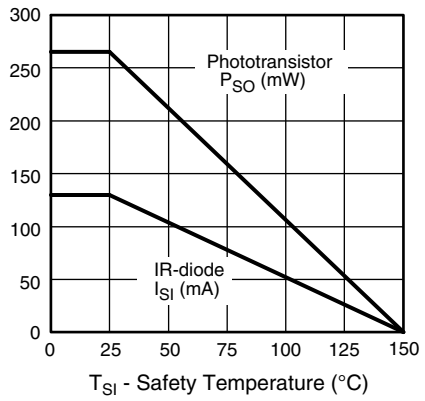


Fig. 2 - Derating Diagram

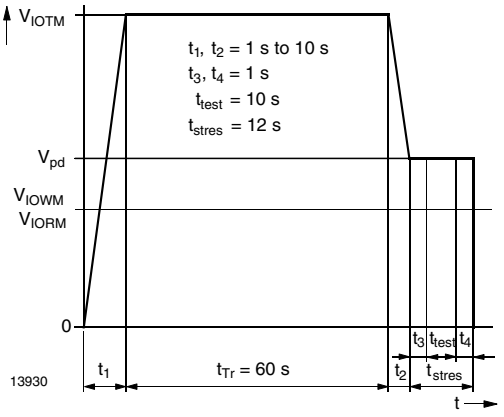


Fig. 3 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-2 (VDE 0884); IEC 60747-5-5

SWITCHING CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Delay time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω (see figure 1)	t_d		3		µs
Rise time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω (see figure 1)	t_r		3		µs
Fall time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω (see figure 1)	t_f		4.7		µs
Storage time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω (see figure 1)	t_s		0.3		µs
Turn-on time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω (see figure 1)	t_{on}		6		µs
Turn-off time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω (see figure 1)	t_{off}		5		µs
Turn-on time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ (see figure 2)	t_{on}		3		µs
Turn-off time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ (see figure 2)	t_{off}		10		µs

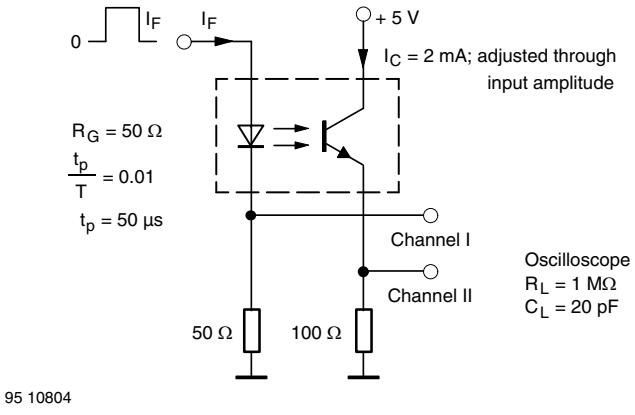


Fig. 1 - Test Circuit, Non-Saturated Operation

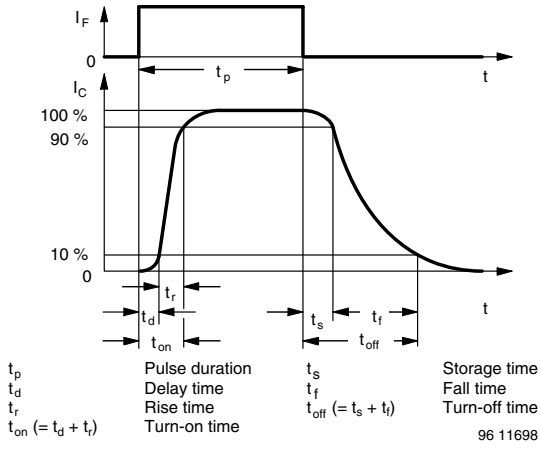


Fig. 3 - Switching Times

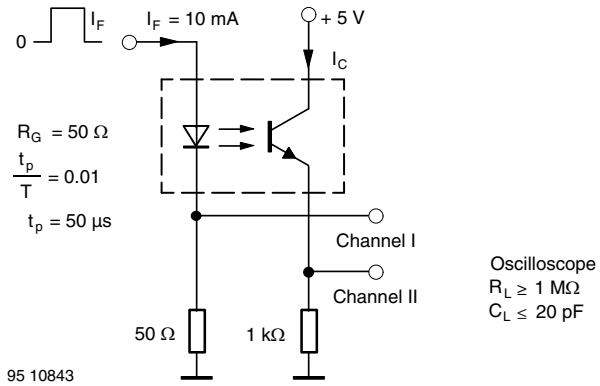


Fig. 2 - Test Circuit, Saturated Operation

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

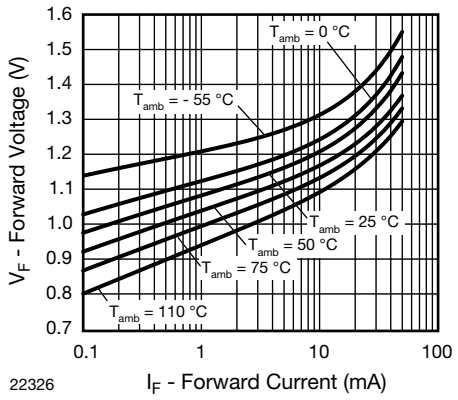


Fig. 4 - Forward Voltage vs. Forward Current

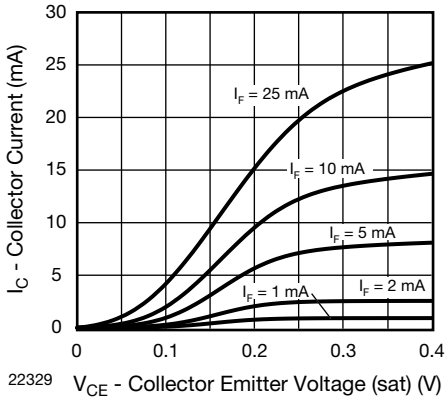


Fig. 7 - Collector Current vs. Collector Emitter Voltage (saturated)

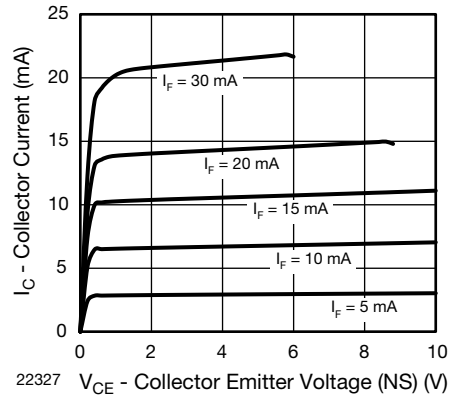


Fig. 5 - Collector Current vs. Collector Emitter Voltage (non-saturated)

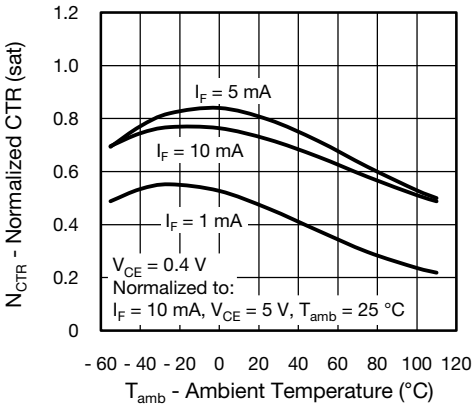


Fig. 8 - Normalized CTR (saturated) vs. Ambient Temperature

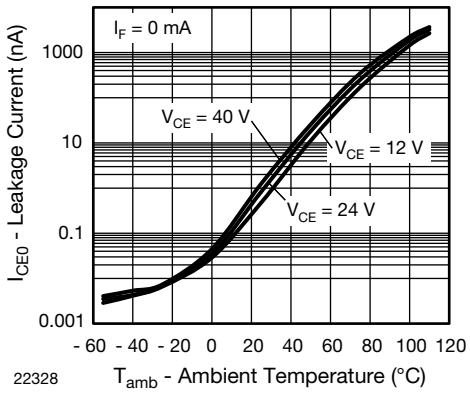


Fig. 6 - Leakage Current vs. Ambient Temperature

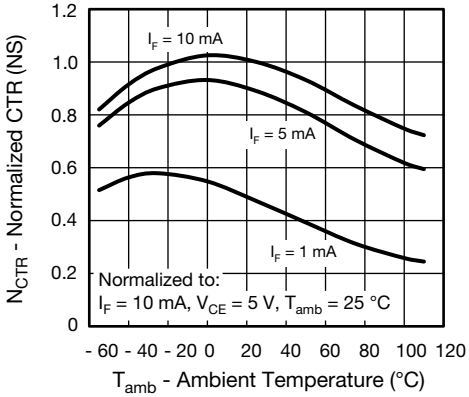


Fig. 9 - Normalized CTR (non-saturated) vs. Ambient Temperature

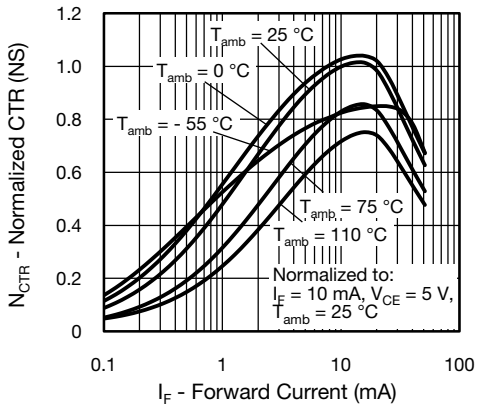


Fig. 10 - Normalized CTR (non-saturated) vs. Forward Current

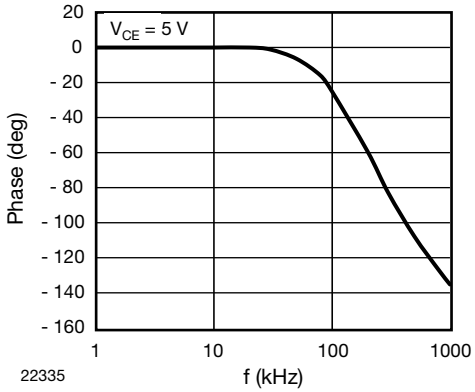


Fig. 13 - F_{CTR} vs. Phase Angle (kHz)

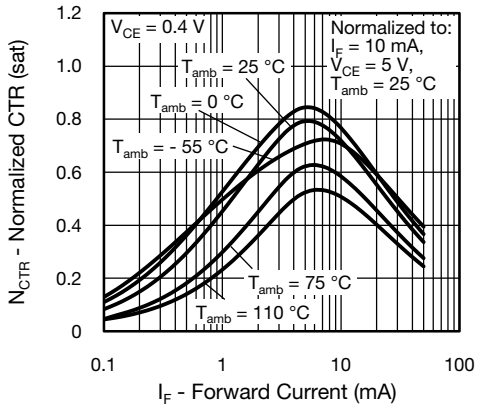


Fig. 11 - Normalized CTR (saturated) vs. Forward Current

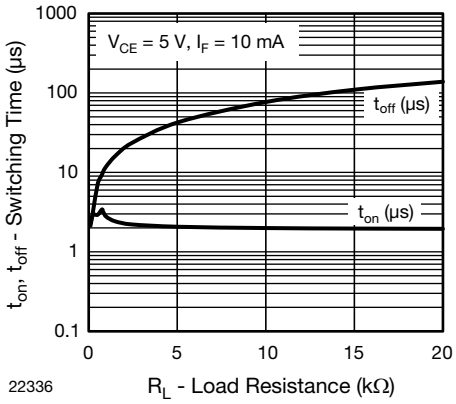


Fig. 14 - Switching Time vs. Load Resistance

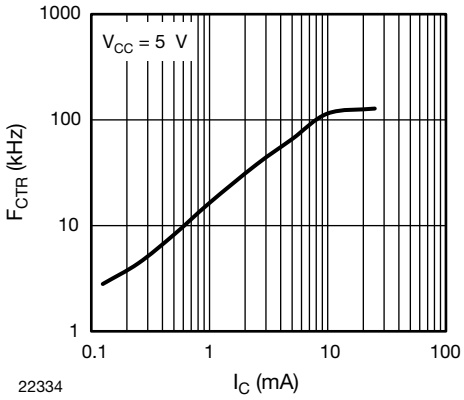
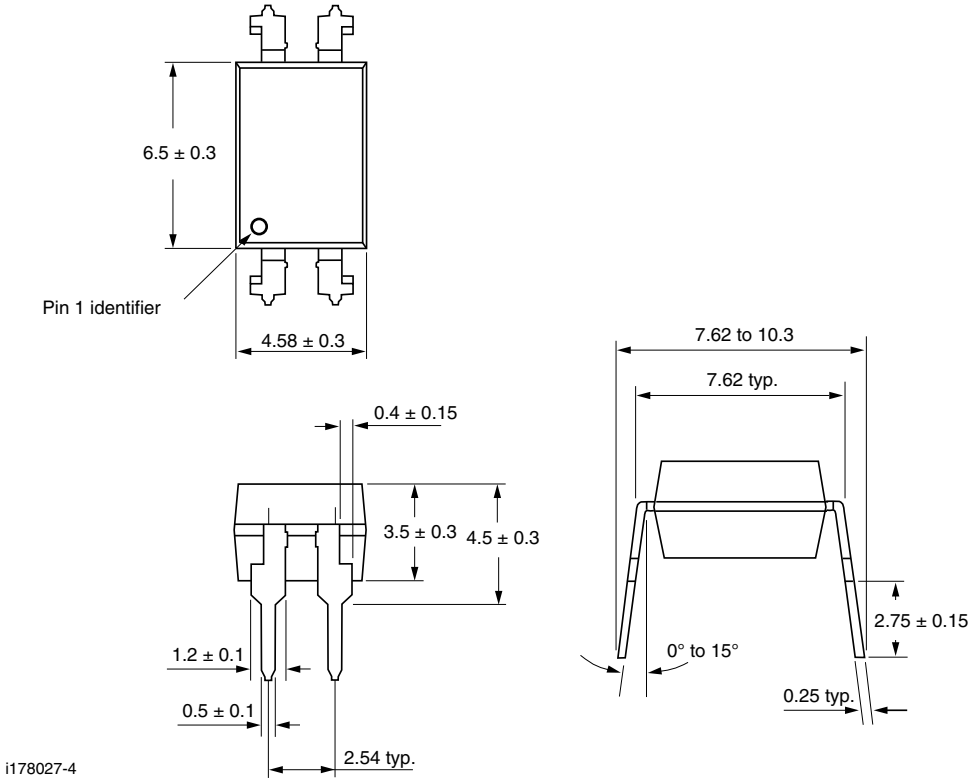
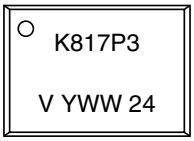


Fig. 12 - F_{CTR} vs. I_C (saturated) (mA)

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING



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