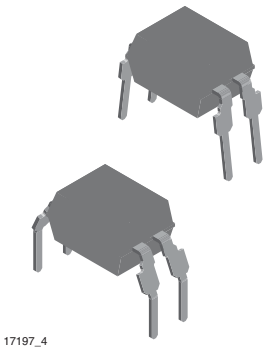
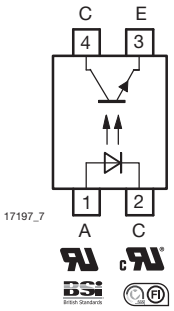
Optocoupler with Transistor Output





DESCRIPTION

The HS817 series consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4-lead plastic dual inline package.

AGENCY APPROVALS

- BSI: EN 60065, EN 60950-1:2006
- FIMKO
- UL file no. E52744
- cUL tested to CSA 22.2 bulletin 5A

FEATURES

- Rated impulse voltage (transient overvoltage) V_{IOTM} = 6 kV_{peak}
- Isolation test voltage (partial discharge test voltage) V_{pd} = 1.6 kV
- Rated isolation voltage (RMS includes DC) V_{IOWM} = 600 V_{RMS}
- Rated recurring peak voltage (repetitive) V_{IORM} = 850 V_{peak}
- Creepage current resistance according to IEC 112, comparative tracking index: CTI ≥ 250
- Thickness through insulation ≥ 0.4 mm
- Isolation materials according to UL 94 V-O
- Pollution degree 2 (resp. IEC 664)
- Climatic classification 55/100/21 (IEC 68 part 1)
- Low temperature coefficient of CTR
- G = leadform 10.16 mm; provides creepage distance > 8 mm, suffix letter “G” is not marked on the optocoupler
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free

e3

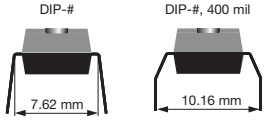
RoHS COMPLIANT

APPLICATIONS

- Switch-mode power supplies
- Line receiver
- Computer peripheral interface
- Microprocessor system interface

ORDERING INFORMATION

H	S	8	1	7	x	x
PART NUMBER					CTR BIN	PACKAGE OPTION



AGENCY CERTIFIED/PACKAGE	CTR (%)	
UL, cUL, BSI, FIMKO	**100 to 300**	**130 to 260**
DIP-4	HS817	HS817B
DIP-4, 400 mil	HS817G	HS817BG

Notes

- G = leadform 10.16 mm; G is not marked on the body.
- For additional information on the available options refer to option information.

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	$T_{amb} \leq 25$ °C	P_{diss}	100	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	$T_{amb} \leq 25$ °C	P_{diss}	150	mW
Junction temperature		T_j	125	°C
COUPLER				
Isolation test voltage (RMS)	t = 1 s	V_{ISO}	5	kV
Total power dissipation	$T_{amb} \leq 25$ °C	P_{tot}	250	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.

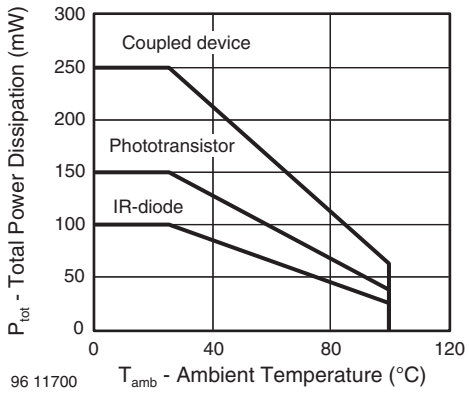


Fig. 1 - Total Power Dissipation vs. Ambient Temperature

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		1.43	1.6	V
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j		50		pF
OUTPUT						
Collector emitter voltage	I_C = 1 mA	V_{CEO}	70			V
Emitter collector voltage	I_E = 100 µA	V_{ECO}	7			V
Collector emitter cut-off current	V_{CE} = 20 V, I_F = 0 A	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	V_{CE} = 5 V, I_F = 10 mA, R_L = 100 Ω	f_c		110		kHz
Coupling capacitance	f = 1 MHz	C_k		0.6		pF

Note

- Minimum and maximum values were tested requierements. 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 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART NUMBER**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	V_{CE} = 5 V, I_F = 5 mA	HS817	CTR	100		300	%
		HS817G	CTR	100		300	
		HS817B	CTR	130		260	
		HS817BG	CTR	130		260	

SAFETY AND INSULATION PARAMETERS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
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}			6	kV
Max. working voltages	Recurring peak voltage	V_{IORM}	850			V_{peak}
Forward current		I_{SI}			130	mA
Power dissipation	$T_{amb} \leq$ 25 °C	P_{SO}			265	mW
Safety temperature		T_{SI}			150	°C
Creepage distance					7.6	mm

Note

- 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.

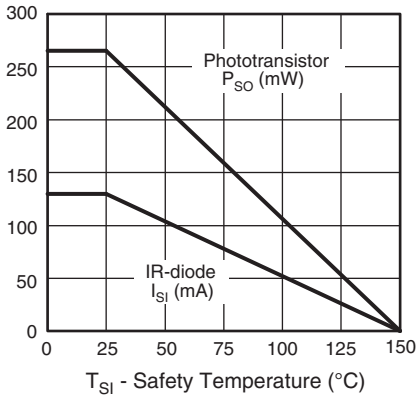


Fig. 2 - Derating Diagram

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Delay time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_d		3		µs
Rise time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_r		3		µs
Fall time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_f		4.7		µs
Storage time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_s		0.3		µs
Turn-on time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_{on}		6		µs
Turn-off time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 3)	t_{off}		5		µs
Turn-on time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see figure 4)	t_{on}		2		µs
Turn-off time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see figure 4)	t_{off}		18		µs

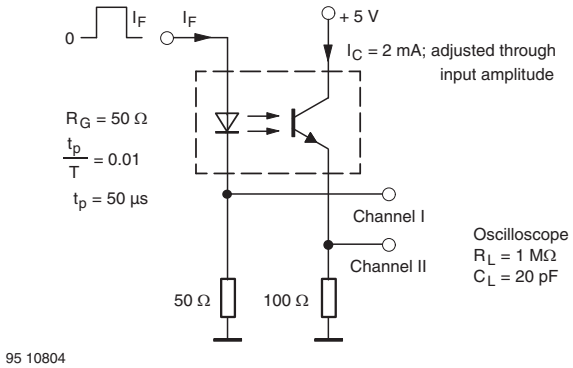


Fig. 3 - Test Circuit, Non-Saturated Operation

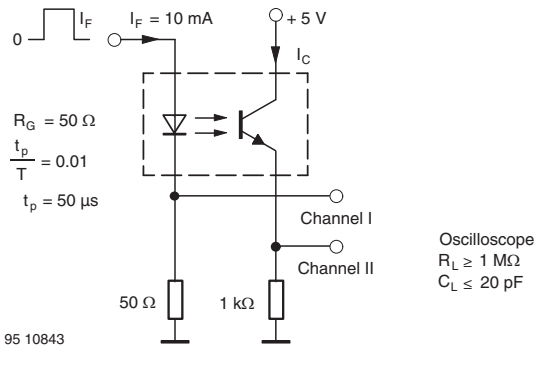


Fig. 4 - Test Circuit, Saturated Operation

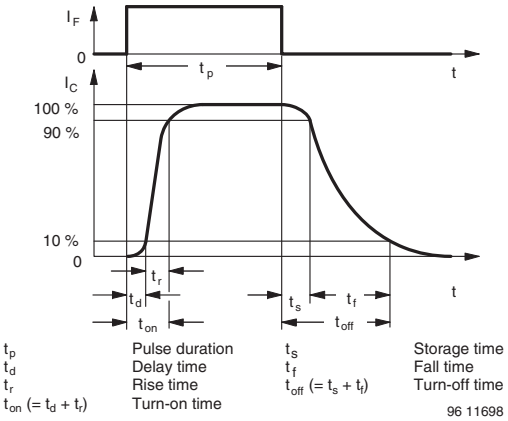


Fig. 5 - Switching Times

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

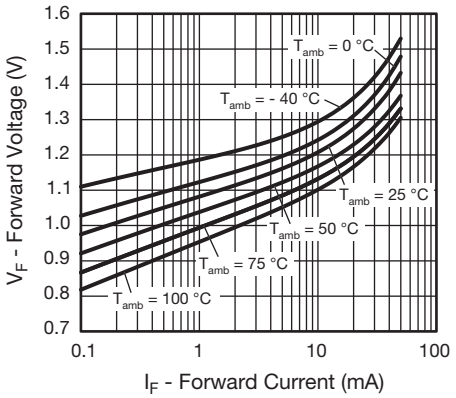


Fig. 6 - Forward Voltage vs. Forward Current

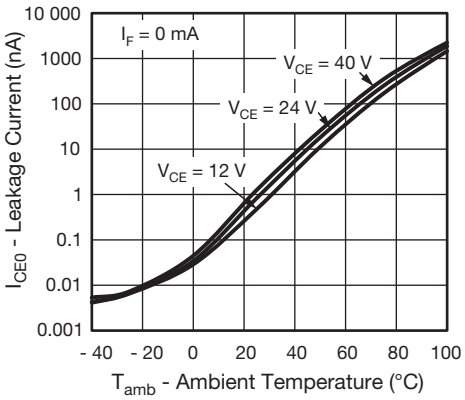


Fig. 8 - Leakage Current vs. Ambient Temperature

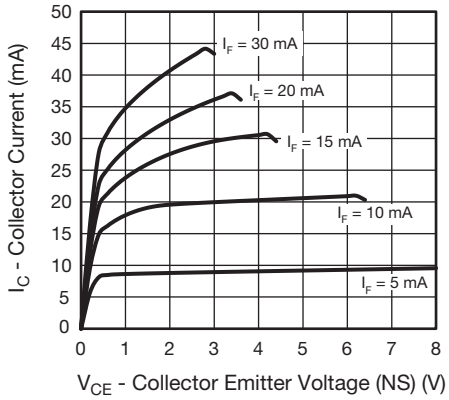


Fig. 7 - Collector Current vs. Collector Emitter Voltage (NS)

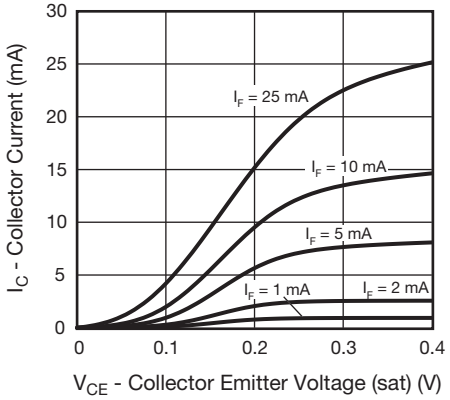


Fig. 9 - Collector Current vs. Collector Emitter Voltage (sat)

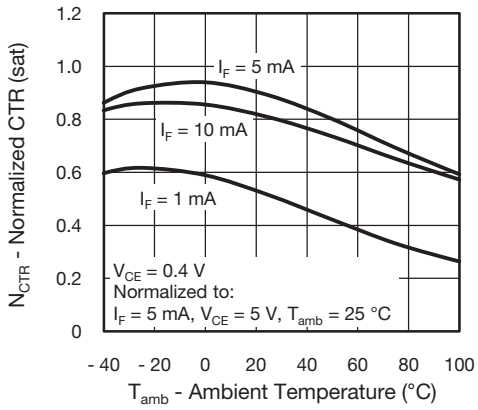


Fig. 10 - Normalized CTR (sat) vs. Ambient Temperature

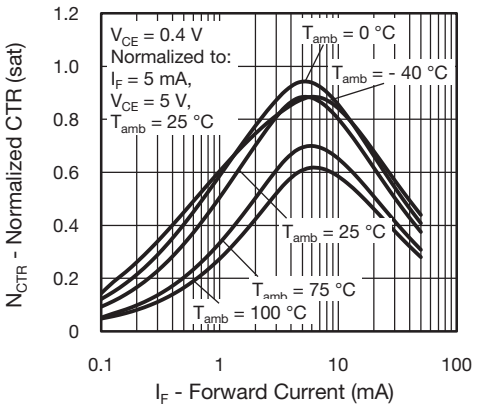


Fig. 13 - Normalized CTR (sat) vs. Forward Current

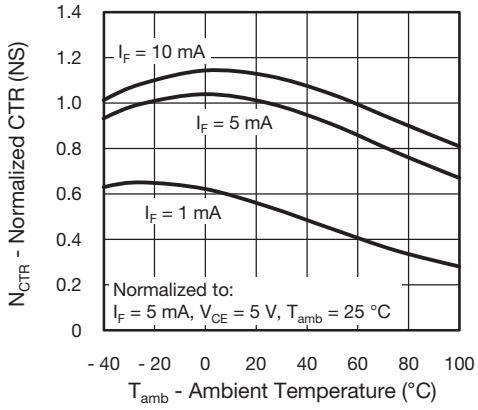


Fig. 11 - Normalized CTR (NS) vs. Ambient Temperature

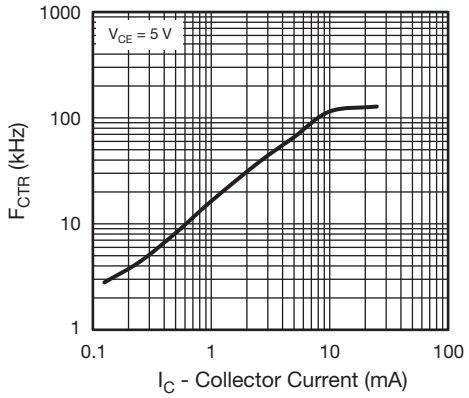


Fig. 14 - F_{CTR} vs. Collector Current

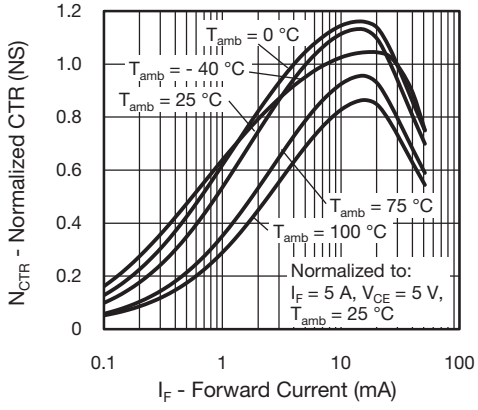


Fig. 12 - Normalized CTR (NS) vs. Forward Current

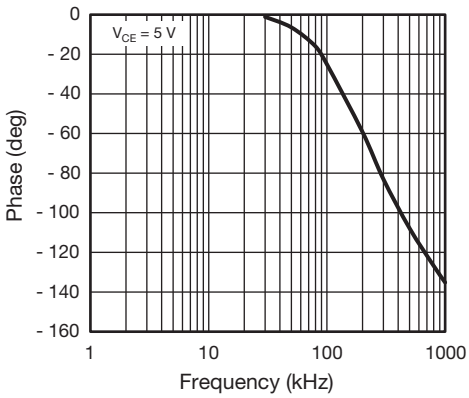


Fig. 15 - F_{CTR} vs. Phase Angle

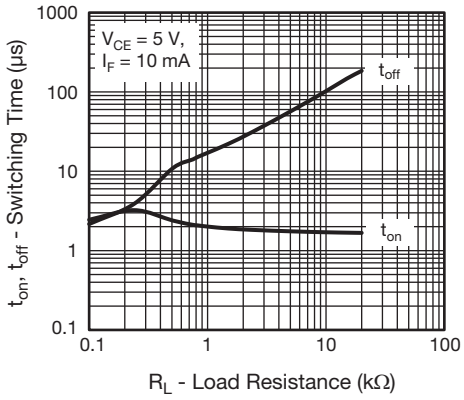
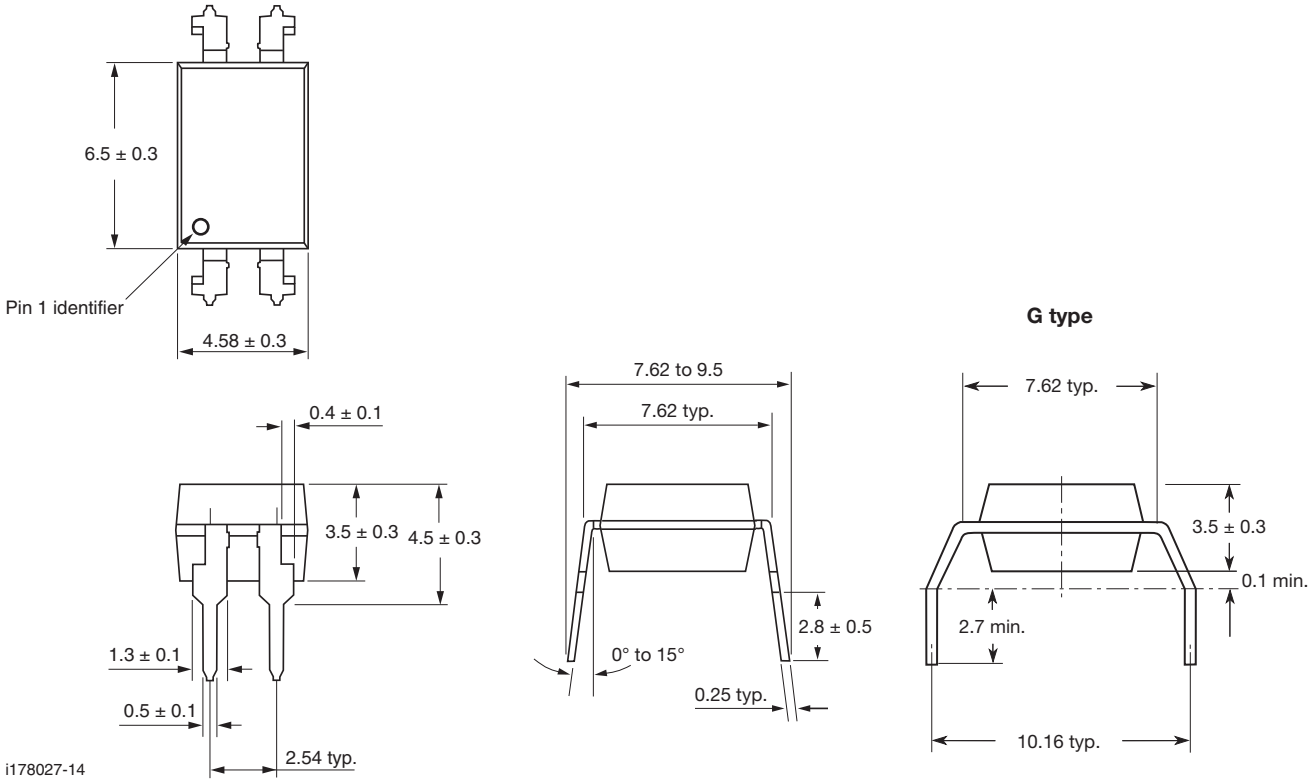
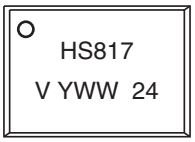


Fig. 16 - Switching Time vs. Load Resistance

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING (example)



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