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CNC7S101 (ON3181)

Optoisolators

■ Overview

CNC7S101 is an AC input compatible optoisolator in which two GaAs high output infrared light emitting diode chips are connected in reverse parallel as light emitting elements, and optically are connected to a high sensitivity Si phototransistor chip as a light detecting element in a small DIL 4-pin package.

The CNC7S101 have a number of excellent features, including high I/O isolation voltage and current transfer ratio (CTR), as well as high speed response and high reliability.

■ Features

- AC input support
- High I/O isolation voltage: V_{ISO} = 5 000 V[rms] (min.)
- Fast response: t_r = 4 µs, t_f = 3 µs
- UL listed (UL File No. E79920)

■ Applications

- Telephones
- Telephone switches
- Programmable controllers
- AC/DC input modules for measuring

■ Absolute Maximum Ratings T_a = 25°C

Parameter		Symbol	Rating	Unit
Input (Light emitting diode)	Power dissipation *1	P_D	75	mW
	Forward current	I_F	±50	mA
	Pulse forward current *2	I_{FP}	±1	A
Output (Photo transistor)	Collector-emitter voltage (Base open)	V_{CEO}	80	V
	Emitter-collector voltage (Base open)	V_{ECO}	7	V
	Collector current	I_C	50	mA
	Collector power dissipation *3	P_C	150	mW
Isolation voltage, input to output *4		V_{ISO}	5 000	V[rms]
Total power dissipation		P_T	200	mW
Operating ambient temperature		T_{opr}	–30 to +100	°C
Storage temperature		T_{stg}	–55 to +125	°C

Note) *1: Input power derating ratio is 0.75 mW/°C at $T_a \geq 25°C$

*2: Pulse width ≤ 100 µs, repeat 100 pps

*3: Output power derating ratio is 1.5 mW/°C at $T_a \geq 25°C$

*4: AC 1 min. RH < 60%

Note) The part number in the parenthesis shows conventional part number.

■ Electrical-Optical Characteristics T_a = 25°C±3°C

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Input characteristics	Forward voltage	V_F	I_F = ±50 mA		1.35	1.50	V
	Terminal capacitance	C_t	V_R = 0 V, f = 1 MHz		35		pF
Output characteristics	Collector-emitter voltage (Base open)	V_{CEO}	I_C = 100 μA	80			V
	Emitter-collector voltage (Base open)	V_{ECO}	I_E = 10 μA	7			V
	Collector-emitter cutoff current (Base open)	I_{CEO}	V_{CE} = 20 V		5	100	nA
	Collector-emitter capacitance	C_C	V_{CE} = 10 V, f = 1 MHz		3.0		pF
Transfer characteristics	DC current transfer ratio *1, *2	CTR	V_{CE} = 5 V, I_F = ±1 mA	20		300	%
	Isolation capacitance, input to output	C_{ISO}	f = 1 MHz		0.6		pF
	Isolation resistance, input to output	R_{ISO}	V_{ISO} = 500 V	10^{11}			Ω
	Rise time *3	t_r	V_{CC} = 10 V, I_C = 2 mA, R_L = 100 Ω		4		μs
	Fall time *4	t_f			3		μs
	Collector-emitter saturation voltage	$V_{CE(sat)}$	I_F = ±20 mA, I_C = 1 mA		0.1	0.2	V
	Collector current ratio *5	$I_{C(Ratio)}$	V_{CE} = 5 V, I_F = 1 mA	0.33	1.00	3.00	—

Note) 1. Input and output are practiced by electricity.

2. This device is designed by disregarding radiation.

3. *1:

$$\text{CTR} \frac{I_C}{I_F} \times 100\%$$

*2: Rank classification

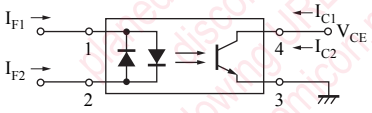
Rank	R	S	No-rank
CTR (%)	50 to 150	100 to 300	20 to 300

*3: t_r : Time required for the collector current to increase from 10% to 90% of its final value

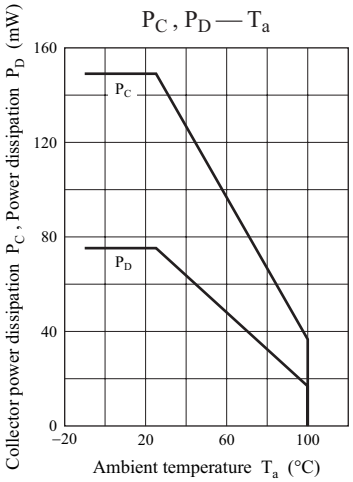
*4: t_f : Time required for the collector current to decrease from 90% to 10% of its initial value

*5:

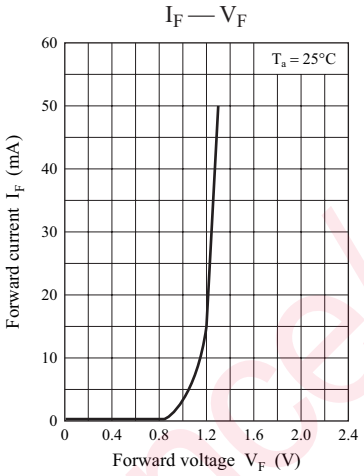
$$I_{C(Ratio)} = \frac{I_{C2}\ (I_{F2} = 1\ \text{mA}, V_{CE} = 5\ \text{V})}{I_{C1}\ (I_{F1} = 1\ \text{mA}, V_{CE} = 5\ \text{V})}$$



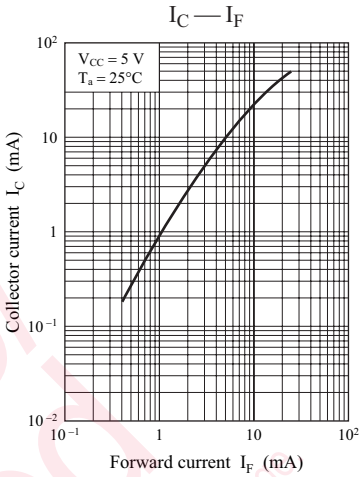
P_C , P_D — T_a



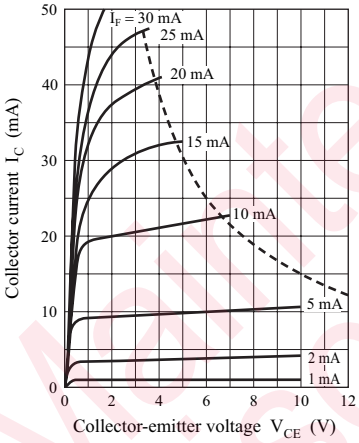
I_F — V_F



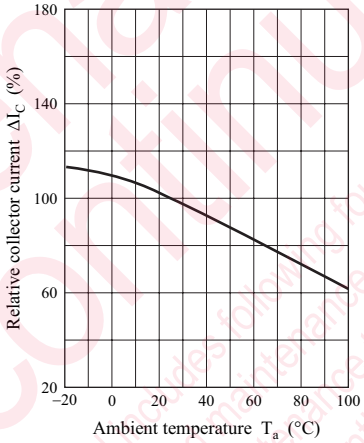
I_C — I_F



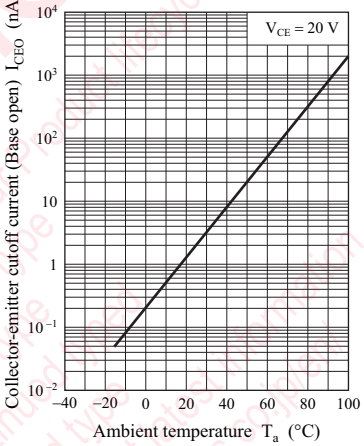
I_C — V_{CE}



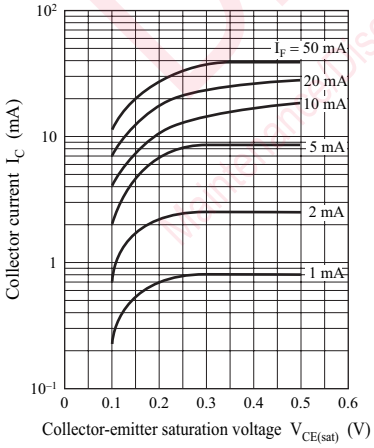
ΔI_C — T_a



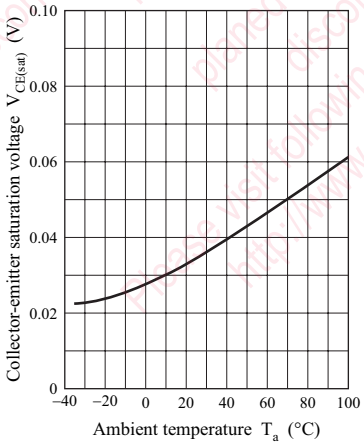
I_{CEO} — T_a



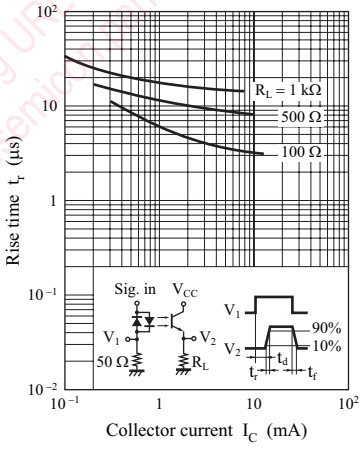
I_C — $V_{CE(sat)}$



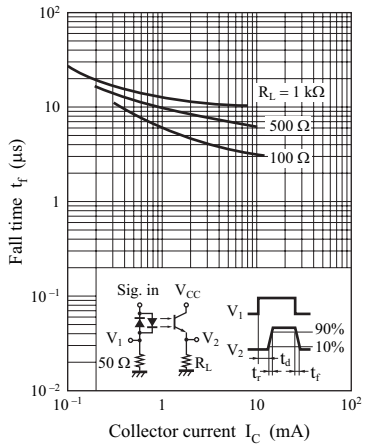
$V_{CE(sat)}$ — T_a



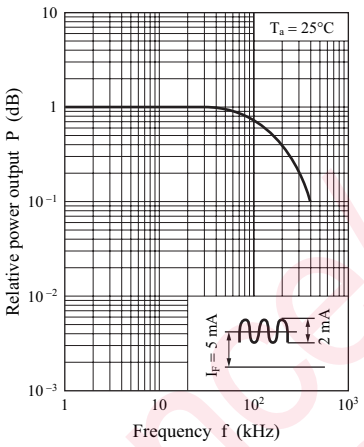
t_r — I_C



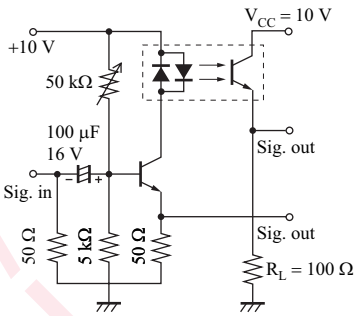
t_f — I_C



P — f

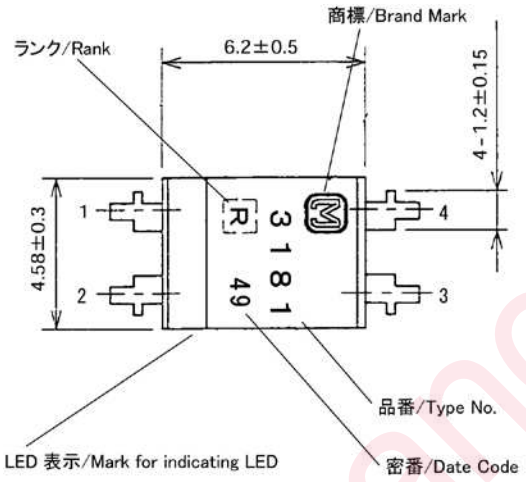


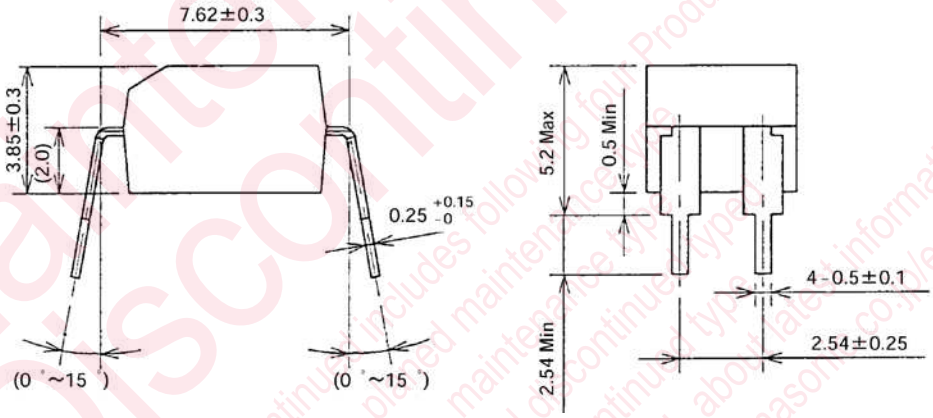
Measurement circuit of frequency characteristics



■ Package (Unit: mm)

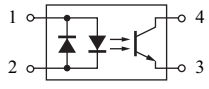
LCTXXN4Z0001





- Pin name
  1: Anode, Cathode
  2: Cathode, Anode
  3: Emitter
  4: Collector

■ Internal Connection



Top View

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