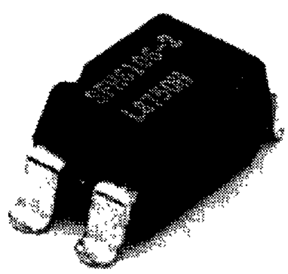
SIEMENS

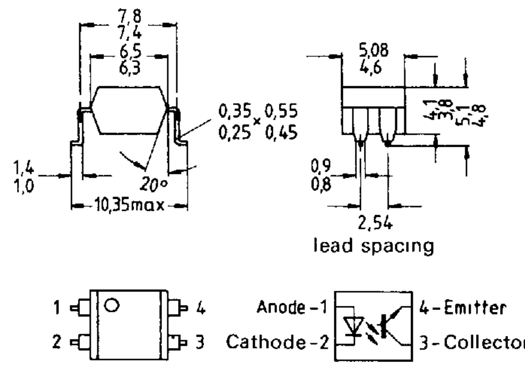
SFH 6106

T-41-83

2.8 kV TRIOS*® OPTOCOUPLERS HIGH RELIABILITY



Package Dimensions mm



Optocouplers (Optoisolators)

FEATURES

- Isolation Test Voltage: 2800 V
- High Current Transfer Ratios
  at 10 mA: 40-320%
  at 1 mA: 13–90%
- Short Switching Times
- Minor CTR Degradation
- 100% Burn-In
- Field-Effect Stable by TRIOS
- Temperature Stable
- Good CTR Linearity Depending on Forward Current
- High Collector-Emitter Voltage V_{CEO}=70 V
- Low Saturation Voltage
- Low Coupling Capacitance
- High Common-Mode Interference Immunity
- UL Approval #52744

DESCRIPTION

The optically coupled isolator SFH 6106 features a high current transfer ratio, low coupling capacitance, and high isolation voltage. As emitter it employs a GaAs infrared emitting diode which is optically coupled with a silicon planar phototransistor acting as detector.

The component is incorporated in a plastic plug-in DIP-4 package. The bent terminal pins are suitable for surface mounting (SMD).

The coupling device permits to transfer signals between two electrically ioslated circuits. The potential difference between the circuits to be coupled is not allowed to exceed the maximum permissible reference voltages

*TRansparent IOn Shield

Maximum Ratings

Emitter (GaAs LED)

Reverse Voltage	6 V
DC Forward Current	60 mA
Surge Forward Current (t≤10 µs)	2.5 A
Total Power Dissipation	100 mW

Detector (Silicon Phototransistor)

Collector-Emitter Voltage	70 V
Collector Current	50 mA
Collector Current (t ≤1 ms)	100 mA
Total Power Dissipation	150 mW

Optocoupler

Storage Temperature Range	-55°C to +150°C
Ambient Temperature Range	-55°C to +100°C
Junction Temperature	100°C
Soldering Temperature (max. 10 s)[1]	260°C
Isolation Test Voltage[2] (between emitter and detector referred to standard climate 23/50 DIN 50014)	2800 VDC
Isolation Resistance (V_{IO}=500 V)	10^{11} Ω

Notes:
1 Not for wave-soldering
2 DC test voltage in accordance with VDE 0883/6.80

Characteristics (T_A=25°C)

Emitter (GaAs LED)

Forward Voltage (I_F=60 mA)	V_F	1.25 (≤1.65)	V
Breakdown Voltage (I_R=100 µA)	V_{BR}	30 (≥6)	V
Reverse Current (V_R=6 V)	I_R	0.01 (≤10)	µA
Capacitance (V_R=0 V, f=1 MHz)	C_0	25	pF
Thermal Resistance[1]	R_{thJA}	750	K/W

Detector (Silicon Phototransistor)

Capacitance (V_{CE}=5 V, f=1 MHz)	C_{CE}	6.8	pF
Thermal Resistance[1]	R_{thJA}	500	K/W

Optocoupler

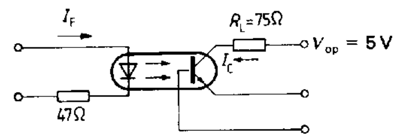
Collector-Emitter Saturation Voltage (I_F=10 mA, I_C=2.5 mA)	V_{CESAT}	0.25 (≤0.4)	V
Coupling Capacitance	C_K	0.35	pF

Note:
1 Static air coupler soldered to PCB or base

The couplers are grouped according to their current transfer ratio I_C/I_F at V_{CE}=5 V, marked by dash numbers.

	-1	-2	-3	-4	
I_C/I_F (I_F=10 mA)	40–80	63–125	100–200	160–320	%
I_C/I_F (I_F=1 mA)	30 (>13)	45 (>22)	70 (>34)	90 (>56)	%
Collector-Emitter Leakage Current (V_{CE}=10 V) (I_{CEO})	2 (≤50)	2 (≤50)	5 (≤100)	5 (≤100)	nA

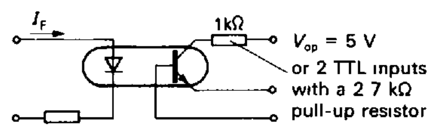
Linear Operation (without saturation)

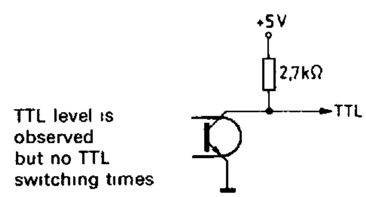


I_F=10 mA, V_{OP}=5 V, T_A=25°C

Load Resistance	R_L	75	Ω
Turn-On Time	t_{ON}	3.0 (≤5.6)	µs
Rise Time	t_R	2.0 (≤4.0)	µs
Turn-Off Time	t_{OFF}	2.3 (≤4.1)	µs
Fall Time	t_F	2.0 (≤3.5)	µs
Cut-Off Frequency	F_{CO}	250	kHz

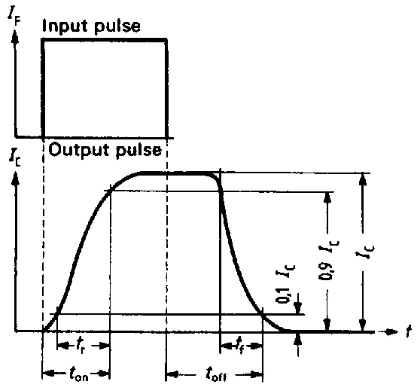
Switching Operation (with saturation)





Group		-1 (I_F=20 mA)	-2 and -3 (I_F=10 mA)	-4 (I_F=5 mA)	
Turn-On Time	t_{ON}	3.0 (≤5.5)	4.2 (≤8.0)	6.0 (≤10.5)	µs
Rise Time	t_R	2.0 (≤4.0)	3.0 (≤6.0)	4.6 (≤8.0)	µs
Turn-Off Time	t_{OFF}	18 (≤34)	23 (≤39)	25 (≤43)	µs
Fall Time	t_F	11 (≤20)	14 (≤24)	15 (≤26)	µs
	V_{CESAT}	0.25 (≤0.4)			V

Switching times



The figure above defines the following times:

Turn-on time (t_{ON})

The turn-on time t_{ON} is the time in which the output current (collector current) I_C rises to 90% of its maximum value after activation of the drive current I_F.

The rise time t_R is the time in which the collector current I_C rises from 10% to 90% of its final value.

Turn-off time (t_{OFF})

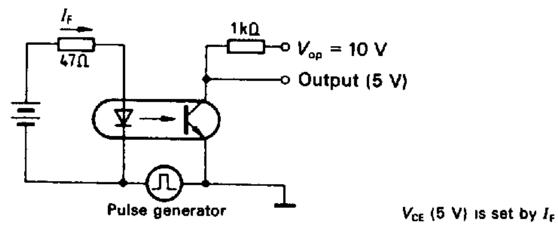
The turn-off time t_{OFF} is the time in which the collector current I_C drops to 10% of its maximum value after deactivation of the drive current I_F.

The fall time t_F is the time in which the collector current I_C drops from 90% to 10% of its maximum value.

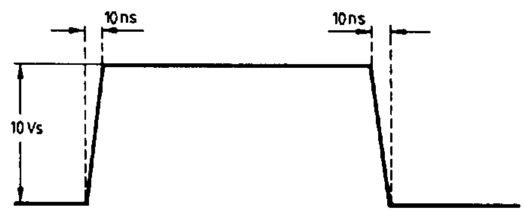
Common-mode interference immunity

Changes in the potential difference between emitter and detector are transferred to the output (collector-emitter) in form of an interference pulse via the coupling capacitance. Optocouplers without base contacting feature a substantially improved common-mode inference immunity, since in this case the part of the load that is coupled in the base connection and additionally intensified by the transistor power gain (B typ. 400) is dropped to a large degree. A further improvement may be obtained by a capacitance between collector and emitter, which hardly influences the switching time, if adequately dimensioned.

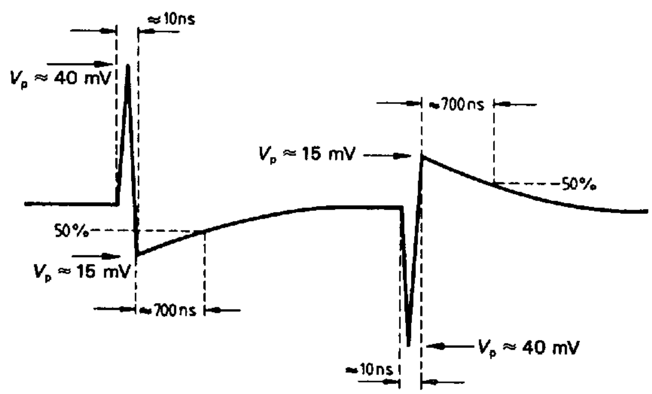
Measuring set-up for pulse diagrams



Input pulse (pulse generator)

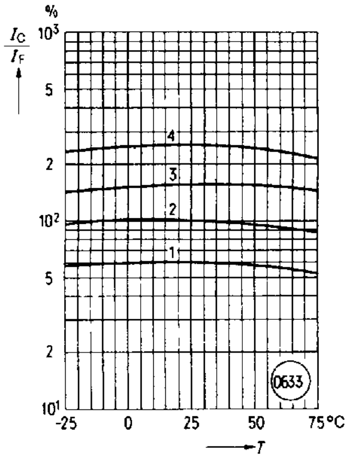


Output pulse (typical)

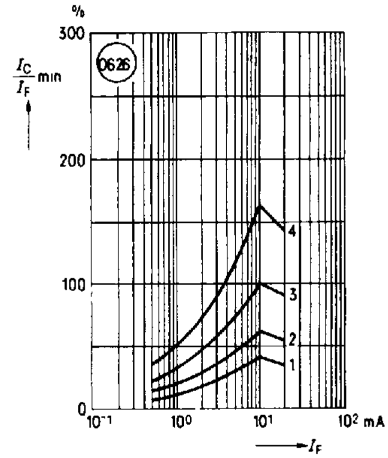


Optocouplers (Optoisolators)

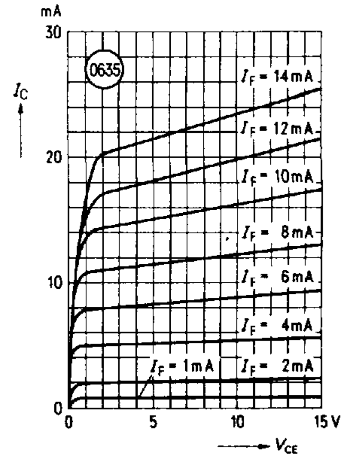
Current transfer ratio (typ.) versus temperature
(I_F=10 mA, V_{CE}=5 V)



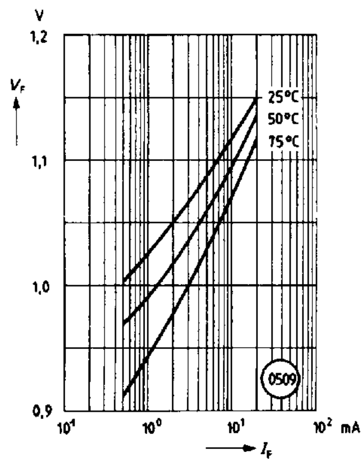
Minimum current transfer ratio versus diode forward current
(T_A=25°C, V_{CE}=5 V)



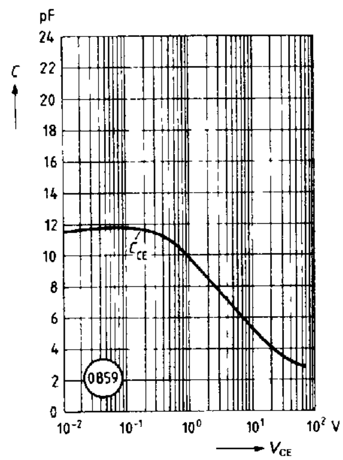
Output characteristics (typ.)
Collector current versus collector-emitter voltage (typ.)
(T_A=25°C)



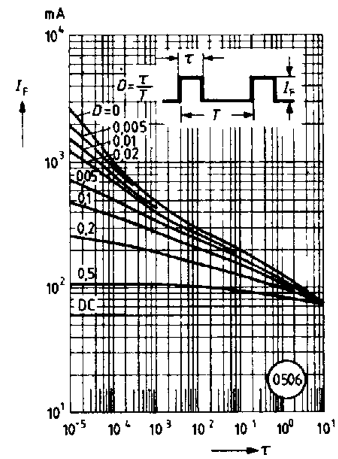
Forward voltage (typ.) of the diode versus forward current



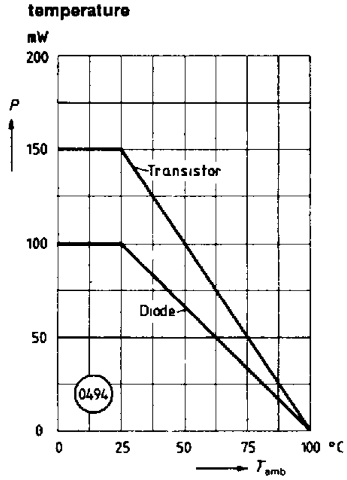
Transistor capacitance (typ.) versus emitter voltage
(T_A=25°C, f=1 MHz)



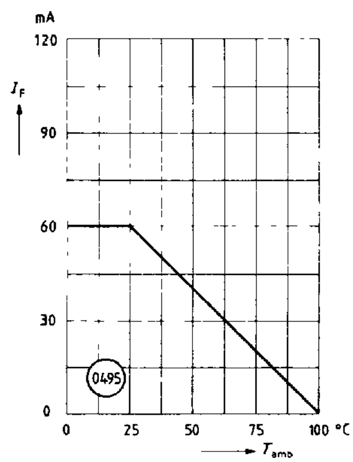
Permissible pulse handling capability
Forward current versus pulse width
(D=parameter, T_A=25°C)



Permissible power dissipation for transistor and diode versus ambient temperature



Permissible forward current of the diode versus ambient temperature



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