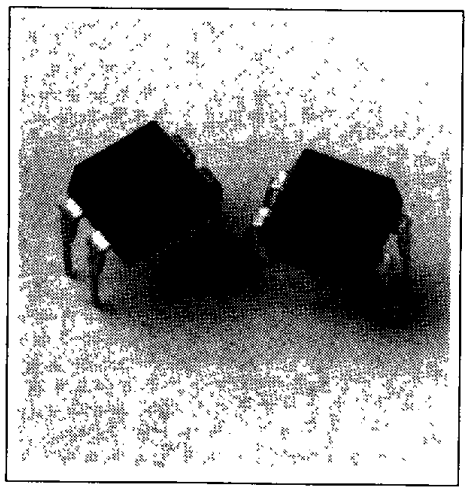
SIEMENS

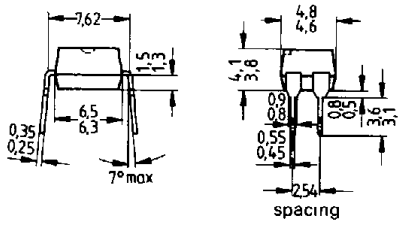
SFH 610
SFH 611
SFH 615

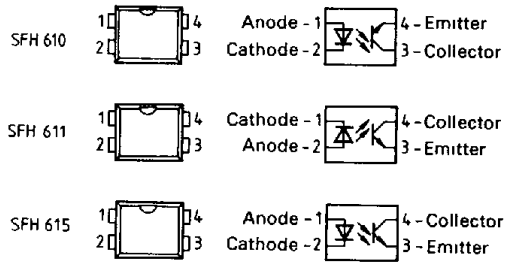
2.8 kV TRIOS*® OPTOCOUPLERS
HIGH RELIABILITY

T-41-83



Package Dimensions mm





FEATURES

- **Isolation Test Voltage: 2800 V**
- **High Current Transfer Ratios at 10 mA: 40-320% at 1 mA: 60% typical (>13)**
- **Fast 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**
- **End-Stackable in 2.54 mm Spacing**
- **High Common-Mode Interference Immunity (Unconnected Base)**
- **UL Approval #52744**
- **VDE Approval 0883**
- **VDE Approval 0884 (Optional with Option 1)**

DESCRIPTION

The optically coupled isolators SFH 610, SFH 611 and SFH 615 feature a high current transfer ratio, low coupling capacitance and high isolation test voltage. They employ a GaAs LED as emitter, which is optically coupled with a silicon planar phototransistor as detector.

The components are incorporated in a plastic plug-in DIP-4 package.

The coupling devices are designed for signal transmission between two electrically separated circuits. The potential difference between the circuits to be coupled is not allowed to exceed the maximum permissible reference voltages.

The couplers are end-stackable in a 2 54 mm spacing and are considered as successor types for the couplers in metal case. The SFH 610, SFH 611 and SFH 615 differ in their arrangement of the terminal pins. Multicouplers can thus easily be implemented and conventional multicouplers can be replaced.

*TRansparent IOn Shield

Maximum Ratings

Emitter (GaAs LED)

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

Detector (Silicon Phototransistor)

Collector-Emitter Voltage ..... 70 V
Collector Current ..... 50 mA
Collector Current ($t \leq 1$ 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 Dip soldering: minimum clearance from bottom edge of package 1.5 mm. Special soldering conditions apply when through-contacted circuit boards are used. Please request appropriate specification.
2 DC test voltage in accordance with DIN 57883, draft 4/78

Characteristics (T_A=25°C)

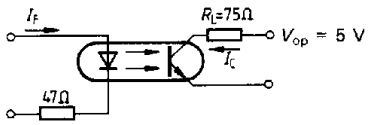
Emitter (GaAs LED)			
Forward Voltage (I_F=60 mA)	V_F	1.25 (≤1.65)	V
Breakdown Voltage (I_R=10 µA)	V_{BR}	30 (≥6)	V
Reverse Current (V_R=6 V)	I_R	0.01 (≤10)	µA
Capacitance (V_R=0 V, f=1 MHz)	C_0	25	pF
Thermal Resistance	R_{thJA}	750	K/W
Detector (Silicon Phototransistor)			
Capacitance (V_{CE}=5 V, f=1 MHz)	C_{CE}	6.8	pF
Thermal Resistance	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	0.25	pF

The optocouplers 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

SWITCHING TIMES

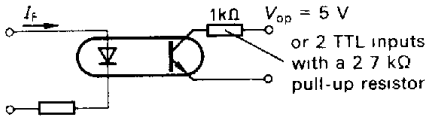
Linear Operation (without saturation)

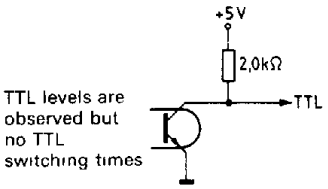


I_F=10 mA, V_{OP}=5 V, T_A=25°C

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

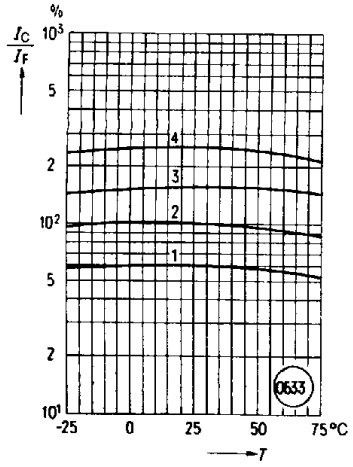
Switching Operation (with saturation)



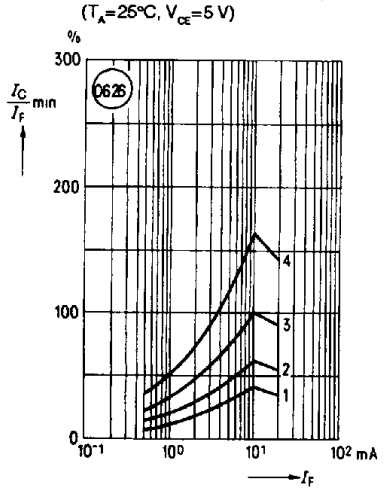


Group	–1 (I_F=20 mA)	–2 and –3 (I_F=10 mA)	–4 (I_F=5 mA)	
Turn-On Time t_{ON}	3.0 (≤5.5)	4.2 (≤8.0)	6.0 (≤10.5)	µs
Rise Time t_R	2.0 (≤4.0)	3.0 (≤6.0)	4.6 (≤8.0)	µs
Turn-Off Time t_{OFF}	18 (≤34)	23 (≤39)	25 (≤43)	µs
Fall Time t_F	11 (≤20)	14 (≤24)	15 (≤26)	µs
V_{CEsat}	0.25 (≤0.4)			V

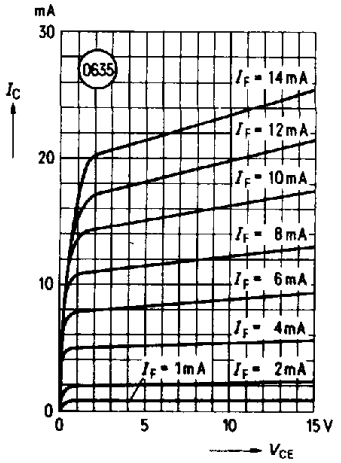
Current transfer ratio (typ.) versus temperature
(I_F=10 mA, V_{CE}=5 V)



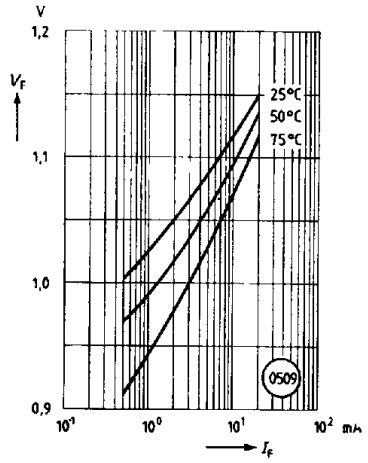
Minimum current transfer ratio versus diode forward current
(T_A=25°C, V_{CE}=5 V)



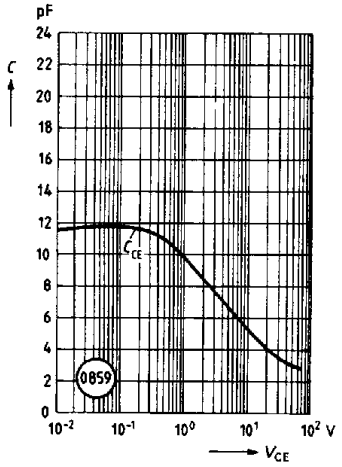
Output characteristics (typ.) Collector current versus collector-emitter voltage
(T_A=25°C)



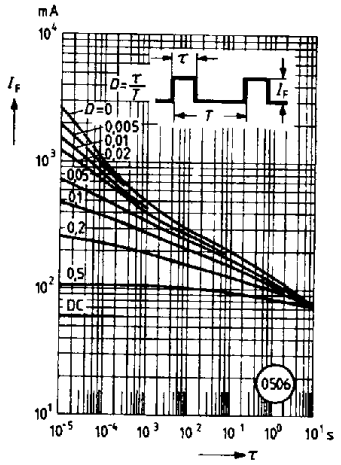
Diode forward voltage (typ.) versus forward current



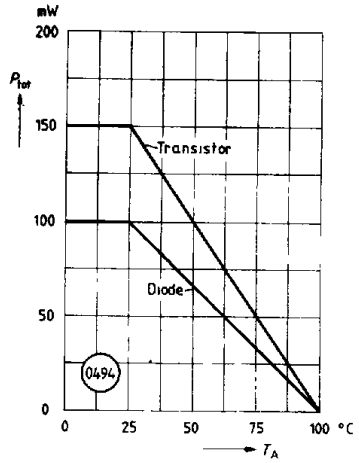
Transistor capacitance (typ.) versus collector-emitter voltage
(T_A=25°C, f=1 MHz)



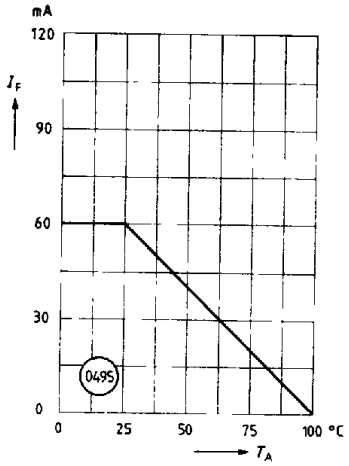
Permissible pulse handling capability Forward current versus pulse width
(D=parameter, T_A=25°C)



Permissible power dissipation versus ambient temperature



Permissible forward current of the diode versus ambient temperature



Current transfer ratio versus load time
(V_{CE}=5 V, R_L=1 kΩ, T_A=60°C, I_F=60 mA, Measuring current=10 mA, Confidence coefficient S=60%)