

FEATURES

- Designed for short distances up to 5 mm
- GaAs infrared emitter
- Silicon NPN phototransistor detector
- Flat plastic package
- Daylight filter against undesired light effects
- High collector-emitter current
0.25 to ≥ 1.0 mA
- Low saturation voltage
- No cross talk

APPLICATIONS

- Position reporting
- Devices and end position switches
- Speed monitoring
- Various types of motion transmitters

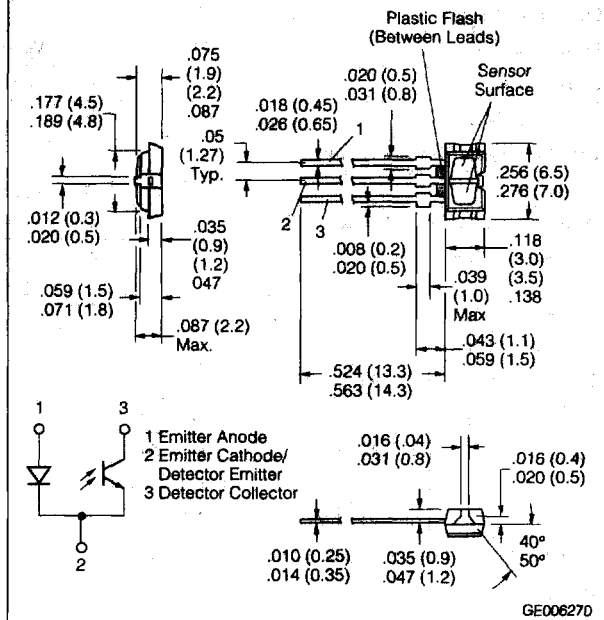
DESCRIPTION

The SFH 900 is a light reflection switch which includes a GaAs IRLED transmitter and an NPN phototransistor with a high photosensitive receiver for short distances, operating in the infrared range. Both components are manufactured in modern strip-line technique and are mounted side-by-side in a plastic package. A daylight filter screens against undesired light effects.

The SFH 900 is designed for applications in industrial and entertainment electronics, e.g., as position reporting devices and end position switches, for speed monitoring or in general, as sensor elements in various types of motion transmitters.

For applications information see Appnote 26.

Dimensions in inches (mm)



Maximum Ratings $T_A=40^\circ\text{C}$

Emitter (GaAs Infrared Diode)

Reverse Voltage (V_R)	6 V
Forward DC Current (I_F)	50 mA
Surge Current (I_{FSM}) $t_p \leq 10 \mu\text{s}$	1.5 A
Total Power Dissipation (P_{TOT})	80 mW

Detector (Silicon Phototransistor)

Collector Emitter Voltage (V_{CE0})	30 V
Emitter Collector Voltage (V_{ECO})	7 V
Collector Current (I_C)	10 mA
Total Power Dissipation (P_{TOT})	100 mW

Light Reflection Switch

Storage/Ambient Temperature Range (T_{STG} , T_A)	-40° to $+85^\circ\text{C}$
Junction Temperature (T_J)	100°C
Soldering Temperature (T_S)	
(Dip soldering time $t \leq 3$ s, ≥ 3 mm from package)	235°C
With Heat Sink between Case and Soldering (T_S)	260°C
Total Power Dissipation (P_{TOT})	150 mW

Characteristics $T_A=25^\circ\text{C}$

Parameter	Symbol	Value	Unit	Condition	
Emitter (GaAs Infrared Diode)					
Forward Voltage	V_F	1.25 (≤ 1.65)	V	$I_F=50\text{ mA}$	
Breakdown Voltage	V_{BR}	≥ 6		$I_R=10\text{ }\mu\text{A}$	
Reverse Current	I_R	.01 (≤ 10)	μA	$V_R=6\text{ V}$	
Capacitance	C_0	40	pF	$V_R=0\text{ V}$, $f=1\text{ MHz}$	
Thermal Resistance	R_{thJA}	750	K/W		
Detector (Silicon Phototransistor)					
Capacitance	C_{CE}	11	pF	$V_{CE}=5\text{ V}$, $f=1\text{ MHz}$	
Collector Emitter Leakage Current	C_{CEO}	20 (≤ 200)	nA	$V_{CE}=10\text{ V}$	
Photocurrent (outside light density)	I_P	3.5	mA	$V_{CE}=5\text{ V}$, $E_V=1000\text{ Lx}$	
Thermal Resistance	R_{thJA}	600	K/W		
Light Reflection Switch					
Collector Emitter Current Kodak neutral white test card, 90% reflection	SFH 900	I_{CE}	> 0.25	mA	$I_F=10\text{ mA}$, $V_{CE}=5\text{ V}$, $d=1\text{ mm}$
	SFH 900-1 ⁽¹⁾		.25 to .50		
	SFH 900-2		.40 to .80		
	SFH 900-3		.63 to 1.25		
	SFH 900-4 ⁽¹⁾		≥ 1.0		
Collector Emitter Saturation Voltage Kodak neutral white test card, 90% reflection	$V_{CE_{SAT}}$	0.2 (≤ 0.6)	V	$I_F=10\text{ mA}$; $d=1\text{ mm}$	
$I_C=85\text{ }\mu\text{A}$	SFH 900				
$I_C=85\text{ }\mu\text{A}$	SFH 900-1 ⁽¹⁾				
$I_C=135\text{ }\mu\text{A}$	SFH 900-2				
$I_C=215\text{ }\mu\text{A}$	SFH 900-3				
$I_C=335\text{ }\mu\text{A}$	SFH 900-4 ⁽¹⁾				

1. Available only on request.

Switching Times $T_A=25^\circ\text{C}$, $V_{CC}=5\text{ V}$, $I_C=1\text{ mA}$ ⁽¹⁾, $R_L=1\text{ K}\Omega$

Description	Value	Unit
Turn-On Time (T_{ON})	65	μs
Rise Time (T_R)	50	
Turn-Off Time (T_{OFF})	55	
Fall Time (T_F)	50	

Note: $I_C=1\text{ mA}$

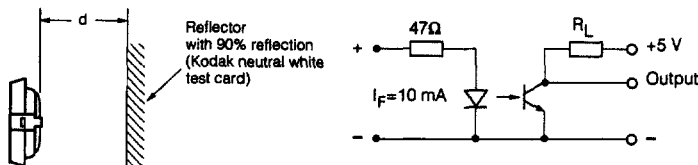


Figure 1. Output characteristics (typ.)
 $I_C=f(V_{CE})$, spacing to reflector: $d=1\text{ mm}$, 90% reflection, $T_A=25^\circ\text{C}$

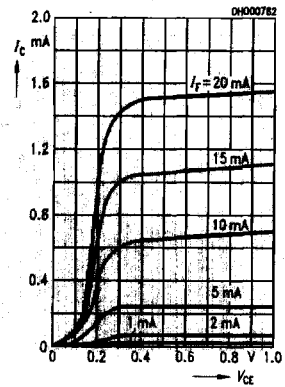


Figure 2. Transistor capacitance (typ.)
 $C_{CE}=f(V_{CE})$, $T_A=25^\circ\text{C}$, $f=1\text{ MHz}$

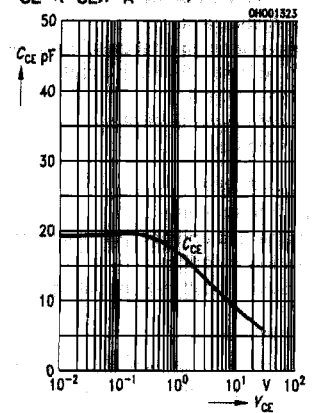


Figure 3. Collector current
 $I_C/I_{C_{max}}=f(d)$

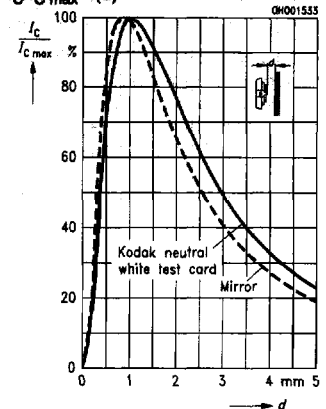


Figure 4. Diode forward voltage (typ.)
 $V_F=f(I_F)$

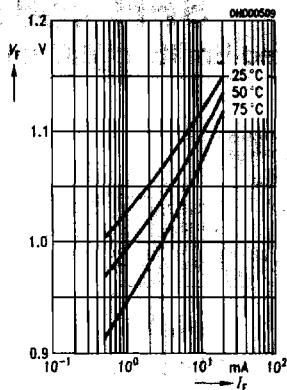


Figure 5. Max. permissible forward current $I_F=f(T_A)$

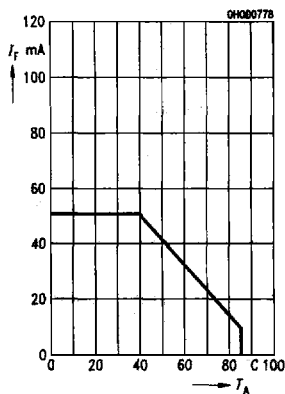


Figure 6. Permissible power dissipation, diode and transistor $P_{TOT}=f(T_A)$

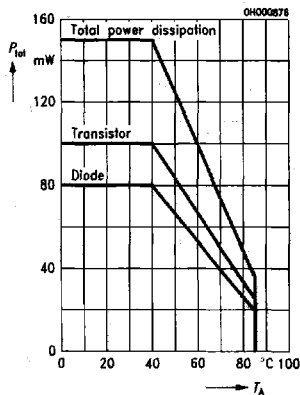


Figure 7. Permissible pulse handling capability $I_F=f(t_p)$, D =parameter, $T_A=25^\circ\text{C}$

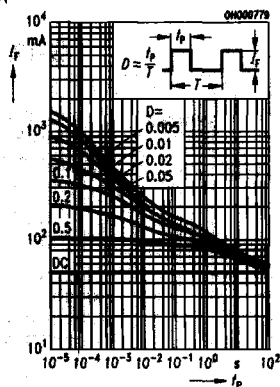


Figure 8. Switching characteristics $t=f(R_L)$, $T_A=25^\circ\text{C}$, $I_F=10\text{ mA}$

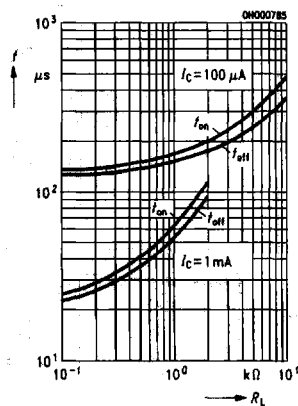


Figure 9. Rel. spectral characteristics, emitter (GaAs) and detector (Si)
 Emitter: $I_{REL}=f(\lambda)$, Detector: $S_{REL}=f(\lambda)$

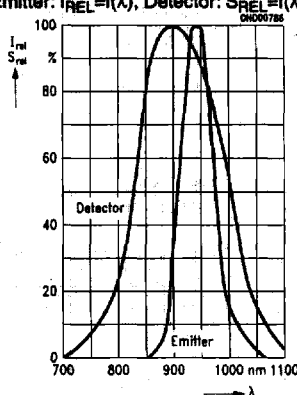


Figure 10. Collector current $I_C=f(I_F)$
 Spacing d to reflector=1 mm, 90% reflection

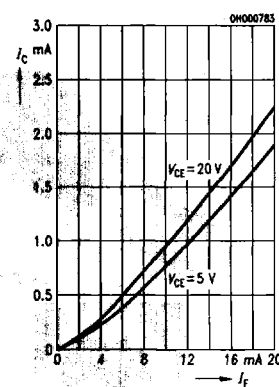
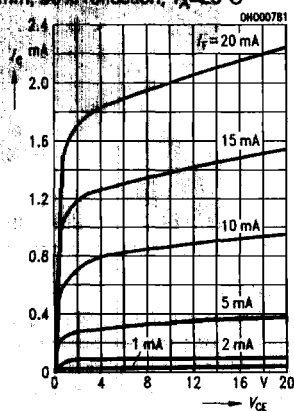


Figure 11. Output characteristics $I_C=f(V_{CE})$, spacing to reflector: $d=1\text{ mm}$, 90% reflection, $T_A=25^\circ\text{C}$



Infrared
Emitters