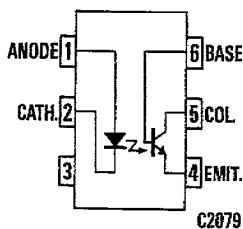
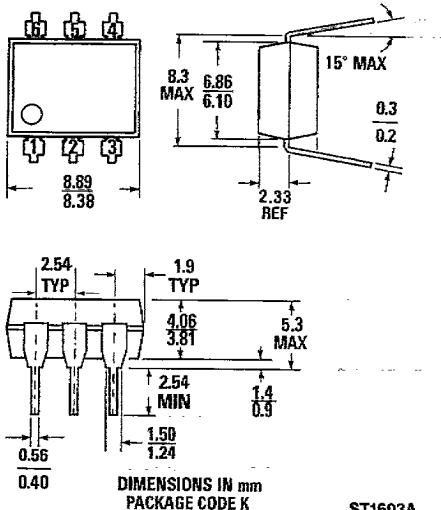


4N25 4N27
4N26 4N28

PACKAGE DIMENSIONS



C2079

Equivalent Circuit

ABSOLUTE MAXIMUM RATINGS

TOTAL PACKAGE

*Storage temperature	-55°C to 150°C
*Operating temperature at junction	-55°C to 100°C
*Lead temperature (soldering, 10 sec)	260°C
*Total package power dissipation at 25°C ambient (LED plus detector)	250 mW
*Derate linearly from 25°C	3.3 mW/°C

INPUT DIODE

*Forward DC current continuous	80 mA
*Reverse voltage	3.0 V
*Peak forward current (300 µs, 2% duty cycle)	3.0 A
*Power dissipation at 25°C ambient	150 mW
*Derate linearly from 25°C	2.0 mW/°C

*Indicates JEDEC Registered Data.

DESCRIPTION

The 4N25, 4N26, 4N27, and 4N28 series of optocouplers have an NPN silicon planar phototransistor optically coupled to a gallium arsenide diode.

FEATURES & APPLICATIONS

- AC line/digital logic isolator
- Digital logic/digital logic isolator
- Telephone/telegraph line receiver
- Twisted pair line receiver
- High frequency power supply feedback control
- Relay contact monitor
- Power supply monitor
- Small package size and low cost
- Excellent frequency response
- UL recognized—File E90700

4N25 4N26 4N27 4N28

ELECTRO-OPTICAL CHARACTERISTICS
 (25°C Free Air Temperature Unless Otherwise Specified)

INDIVIDUAL COMPONENT CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	GUAR. MAX.	UNITS	TEST CONDITIONS
INPUT DIODE						
*Forward voltage	V _F		1.20	1.50	V	I _F =10 mA
Capacitance	C		150		pF	V _F =0 V, f=1 MHz
*Reverse leakage current		.05	100		µA	V _R =3.0 V, R _L =1.0 MΩ
DETECTOR						
DC forward current gain	h _{FE}		250			V _{CE} =5 V, I _C =500 µA
*Collector to emitter breakdown voltage	BV _{CEO}	30	65		V	I _C =1.0 mA, I _E =0
*Collector to base breakdown voltage	BV _{CBO}	70	165		V	I _C =100 µA, I _E =0
*Emitter to collector breakdown voltage	BV _{EBO}	7	14		V	I _E =100 µA, I _B =0
*Collector to emitter leakage current (4N25, 4N26, 4N27)	I _{CEO}		3.5	50	nA	V _{CE} =10 V Base Open
*Collector to emitter leakage current (4N28)				100	nA	
*Collector to base leakage current	I _{CBO}		0.1	20	nA	V _{CB} =10 V Emitter Open

TRANSFER CHARACTERISTICS

DC CHARACTERISTICS	SYMBOL	MIN.	TYP.	GUAR. MAX.	UNITS	TEST CONDITIONS
*Collector output current (a) (4N25, 4N26) (4N27, 4N28)	I _C	2.0	5.0	—	mA	V _{CE} =10 V, I _F =10 mA, I _B =0
		1.0	3.0	—		
*Collector-emitter saturation	V _{CE(SAT)}		0.2	0.5	V	I _C =2.0 mA, I _F =50 mA

TRANSFER CHARACTERISTICS

AC CHARACTERISTICS	SYMBOL	TYP.	UNITS	TEST CONDITIONS
Non-saturated Collector Delay time	t _d	0.5	µs	R _L =100 Ω, I _C =2 mA, V _{CC} =10 V
Rise time	t _r	2.5	µs	(Fig. 10 and 11)
Fall time	t _f	2.6	µs	
Non-saturated Collector Delay time	t _d	2.0	µs	R _L =1kΩ, I _C 2 mA, V _{CC} =10 V
Rise time	t _r	15	µs	(Fig. 10 and 11)
Fall time	t _f	15	µs	

*Indicates JEDEC Registered Data.

- (a) Pulse Test: Pulse Width=300 µs, Duty Cycle <2.0%
- (b) For this test LED pins 1 and 2 are common and Phototransistor pins 4, 5 and 6 are common.
- (c) If adjusted to yield I_C=2 mA and I_C=0.7 mA RMS; Bandwidth referenced to 10 kHz.

ELECTRO-OPTICAL CHARACTERISTICS

(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

TRANSFER CHARACTERISTICS (Cont'd)

AC CHARACTERISTICS	SYMBOL	MIN.	TYP.	GUAR. MAX.	UNITS	TEST CONDITIONS
Saturated t _{on} (from 5 V to 0.8 V)	t _{on} (SAT)		5		μs	R _L =2kΩ, I _F =15 mA, V _{CC} =5 V
t _{off} (from SAT to 2.0 V)	t _{off} (SAT)		25		μs	R _B =Open (Fig. 10)
Saturated t _{on} (from 5 V to 0.8 V)	t _{on} (SAT)		5		μs	R _L =2kΩ, I _F =20 mA, V _{CC} =5 V
t _{off} (from SAT to 2.0 V)	t _{off} (SAT)		18		μs	R _B =100kΩ (Fig. 10)
Non-saturated Base—Collector photo diode						
Rise time	t _r		175		ns	R _L =1kΩ, V _{CB} =10 V
Fall time	t _f		175		ns	
Isolation voltage (b) (4N25, 4N26, 4N27, 4N28)	V _{ISO}	5300	—	—	V	I _{IO} ≤ 1 μA RMS, t=1 minute
*4N26, 4N27		1500	—	—	V	Peak
*4N28		500	—	—	V	Peak
Isolation resistance (b)			10 ¹¹		Ω	V=500 VDC
Isolation capacitance (b)			1.3		pF	V=0, f=1.0 MHz
Bandwidth (c) (also see note 2)	B _w		300		kHz	I _C =2.0 mA, R _L =100 Ω (Fig. 12)

*Indicates JEDEC Registered Data.

(a) Pulse Test: Pulse Width=300 μs, Duty Cycle <2.0%

(b) For this test LED pins 1 and 2 are common and Phototransistor pins 4, 5 and 6 are common.

(c) If adjusted to yield I_C=2 mA and I_c=0.7 mA RMS; Bandwidth referenced to 10 kHz.

TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified)

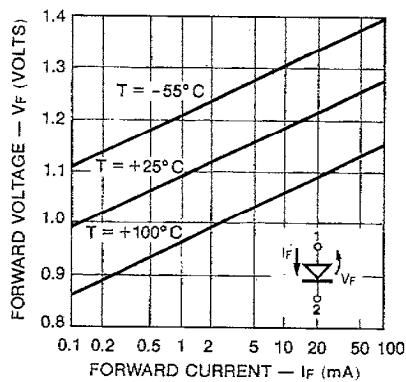


Fig. 1. Forward Voltage vs.
Current

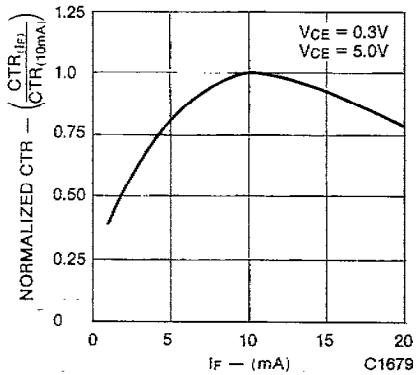
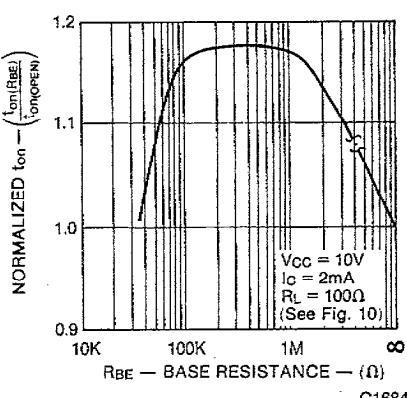
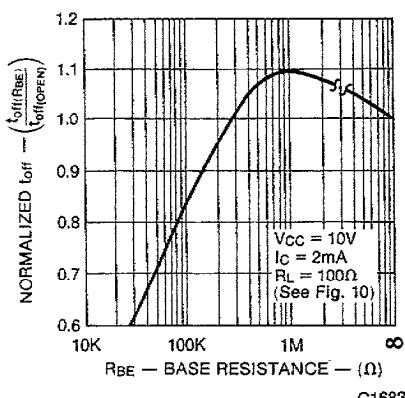
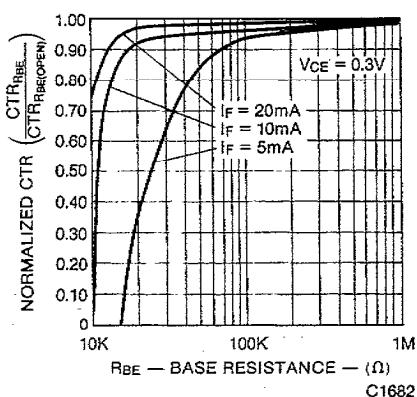
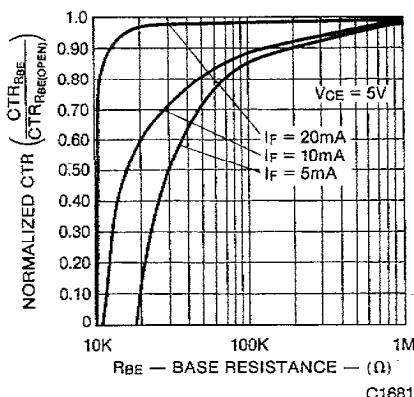
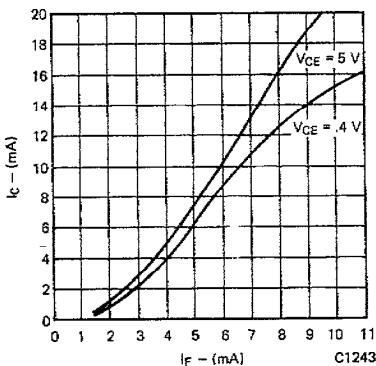
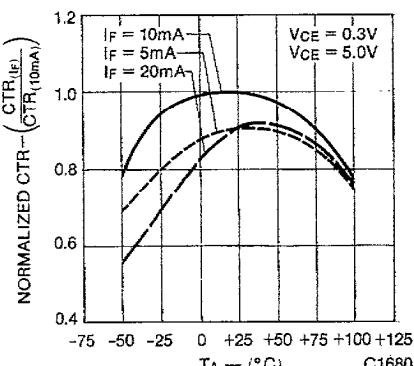


Fig. 2. Normalized CTR vs.
Forward Current

TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES
 (25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)


TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES
(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

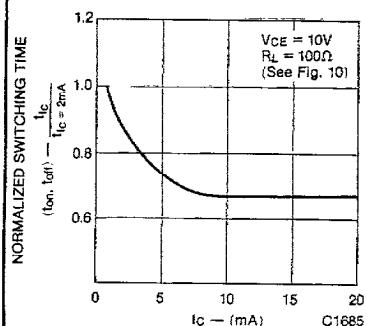


Fig. 9. Switching Time vs. IC

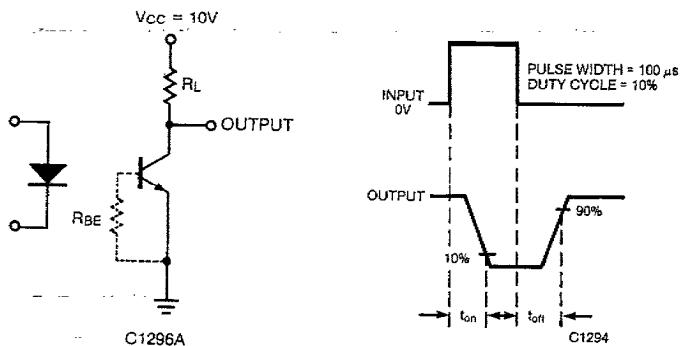


Fig. 10. Switching Time Test Circuit

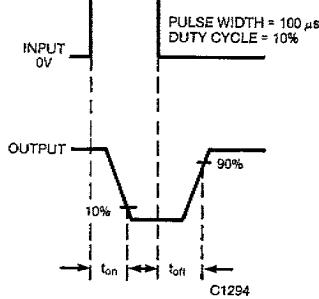


Fig. 11. Switching Time Waveforms

OPERATING SCHEMATICS

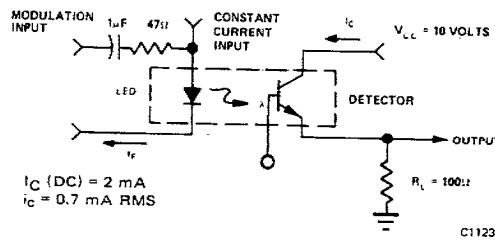


Fig. 12. Modulation Circuit Used to Obtain Output vs. Frequency Plot

NOTES

1. The current transfer ratio (I_C/I_p) is the ratio of the detector collector current to the LED input current with V_{CE} at 10 volts.
2. The frequency at which i_c is 3dB down from the 10 kHz value.
3. Rise time (t_r) is the time required for the collector current to increase from 10% of its final value to 90%. Fall time (t_f) is the time required for the collector current to decrease from 90% of its initial value to 10%.