SLOTTED OPTICAL SWITCHES
PHOTO INTEGRATED CIRCUIT

KT 960/970/980/990 SERIES

Optek Technology, Inc.
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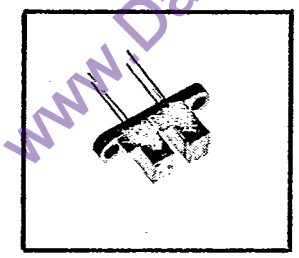
(214) 542-9461



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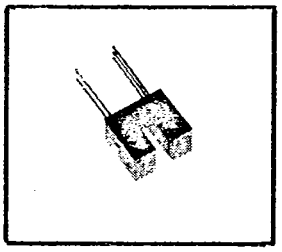

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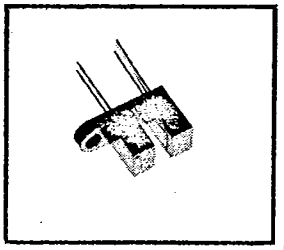

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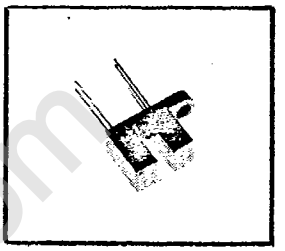


PACKAGE P

DESCRIPTION

The KT960/970 series of Photo Integrated Circuit (P.I.C.) Switches provides optimum flexibility for the design engineer. Building from a standard housing of .125" wide slot, the user can specify (1) type and polarity of TTL output, (2) mounting tab configuration, (3) discrete shell, and (4) aperture widths.

The electrical output can be specified as either TTL totem pole or TTL open collector. Either may be supplied with inverter or buffer output polarity. All have the added stability of a built in hysteresis amplifier.

All housings are an opaque grade of injection-molded polysulfone (P1700-935) to minimize the assembly's sensitivity to ambient radiation, both visible and near-infrared. Discrete shells (exposed only on the parallel faces inside the device throat) are either IR transmissive polysulfone (P1700-1615) for applications where aperture contamination may occur, or opaque polysulfone where maximum protection against ambient radiation is a concern.

PART NUMBER GUIDE

KT9XXXXXX

- KT — Optek Assembly
- 9 — Photo Integrated Circuit Sensor Family
- X — Discrete Shell Material Designation
  - 6 = IR Transmissive Polysulfone Discrete Shells With .02" Sq. Leads On .320" Spacing
  - 7 = Opaque Polysulfone Discrete Shells With .02" Sq. Leads on .320" Spacing
- X — Electrical Specification Variations
  - 0 = Buffer with Totem-Pole Output
  - 1 = Buffer with Open-Collector Output
  - 2 = Inverter with Totem-Pole Output
  - 3 = Inverter with Open-Collector Output
- X — Mounting Configurations
  - T = Both Mounting Tabs
  - N = No Mounting Tabs
  - L = Single Mounting Tab Emitter Side
  - P = Single Mounting Tab Sensor Side
- X — Aperture Width In Front Of Sensor
  - 5 = .050" 1 = .010"
- X — Aperture Width in Front of Emitter
  - 5 = .050"

EXAMPLE

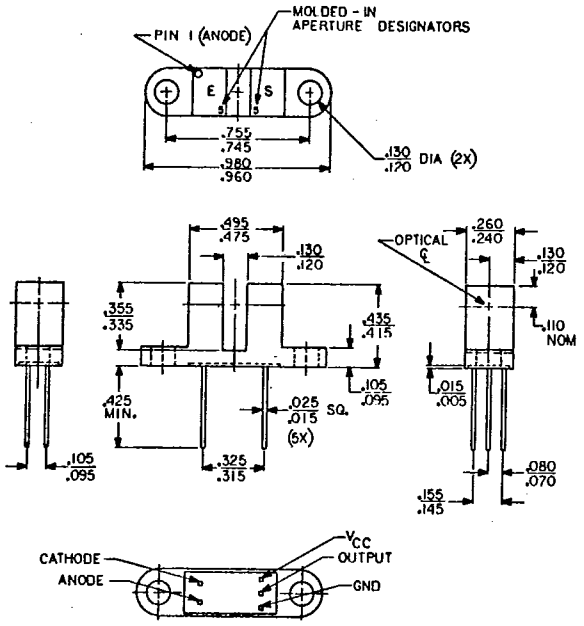
KT970N51

- KT — Optek Assembly
- 9 — Photo Integrated Circuit Output
- 7 — Opaque Polysulfone Discrete Shell With .02" Sq. leads on .320" Spacing
- 0 — Buffer with Totem Pole Output
- N — No Tabs
- 5 — .050" Aperture in Front of Emitter
- 1 — .010" Aperture in Front of Sensor

REVISED NOVEMBER 1986

PACKAGE CONFIGURATION

PACKAGE T



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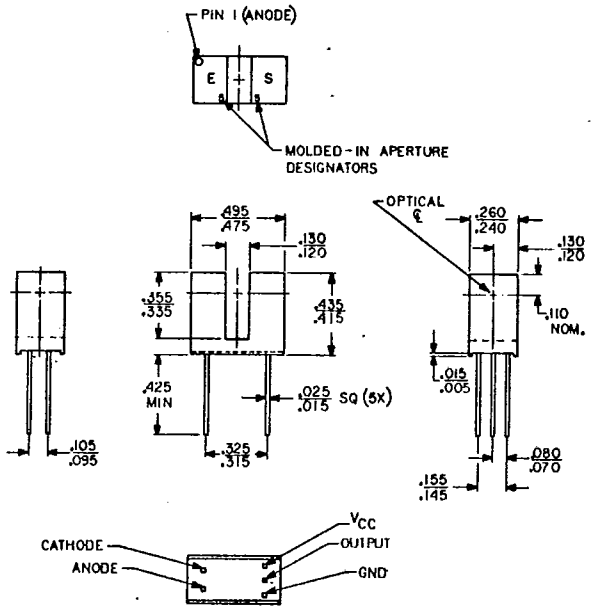

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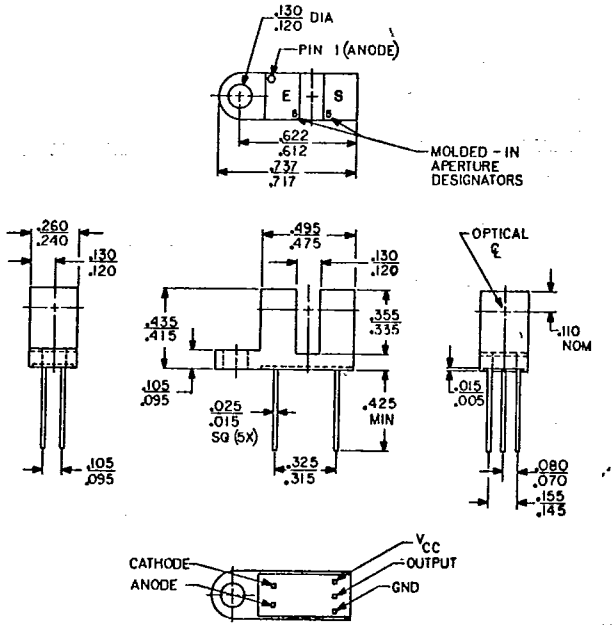

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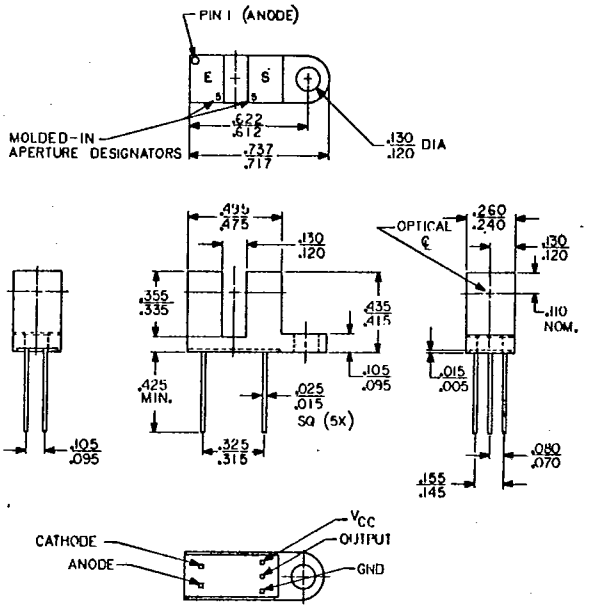

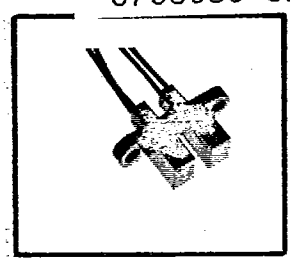

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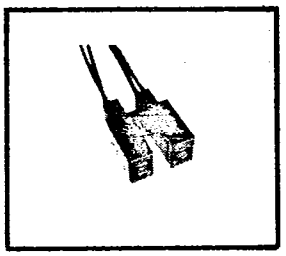

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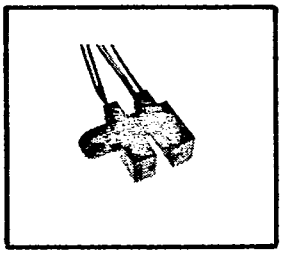

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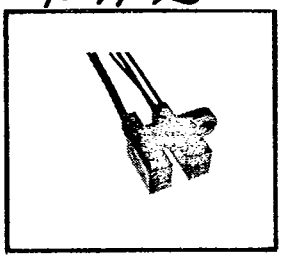


PACKAGE P

DESCRIPTION

The KT980/990 series of Photo Integrated Circuit (P.I.C.) Switches provides optimum flexibility for the design engineer. Building from a standard housing of .125" wide slot, the user can specify (1) type and polarity of TTL output, (2) mounting tab configuration, (3) discrete shell, and (4) aperture widths.

The electrical output can be specified as either TTL totem pole or TTL open collector. Either may be supplied with inverter or buffer output polarity. All have the added stability of a built in hysteresis amplifier.

All housings are an opaque grade of injection-molded polysulfone (P1700-935) to minimize the assembly's sensitivity to ambient radiation, both visible and near-infrared. Discrete shells (exposed only on the parallel faces inside the device throat) are either IR transmissive polysulfone (P1700-1615) for applications where aperture contamination may occur, or opaque polysulfone where maximum protection against ambient radiation is a concern.

Each terminal of the devices in this series is terminated with 24 inches of 7 strand 26 AWG, UL1429 insulated wire. Insulation colors and functions are:

Red - IRED Anode	White - V_{CC}
Black - IRED Cathode	Blue - Output
	Green - Ground

Other wire lengths and/or colors are available. See your local representive or call the factory..

PART NUMBER GUIDE

KT9XXXXX

- Optek Assembly
- Photo Integrated Circuit Sensor Family
- Discrete Shell Material Designation
  - 8 = IR Transmissive Polysulfone Discrete Shells With 26 AWG UL1429 Wires 24" Long
  - 9 = Opaque Polysulfone Discrete Shells With 26 AWG UL1429 Wires 24" Long
- Electrical Specification Variations
  - 0 = Buffer with Totem-Pole Output
  - 1 = Buffer with Open-Collector Output
  - 2 = Inverter with Totem-Pole Output
  - 3 = Inverter with Open-Collector Output
- Mounting Configurations
  - T = Both Mounting Tabs
  - N = No Mounting Tabs
  - L = Single Mounting Tab Emitter Side
  - P = Single Mounting Tab Sensor Side
- Aperture Width in Front of Sensor
  - 5 = .050" 1 = .010"
- Aperture Width in Front of Emitter
  - 5 = .050"

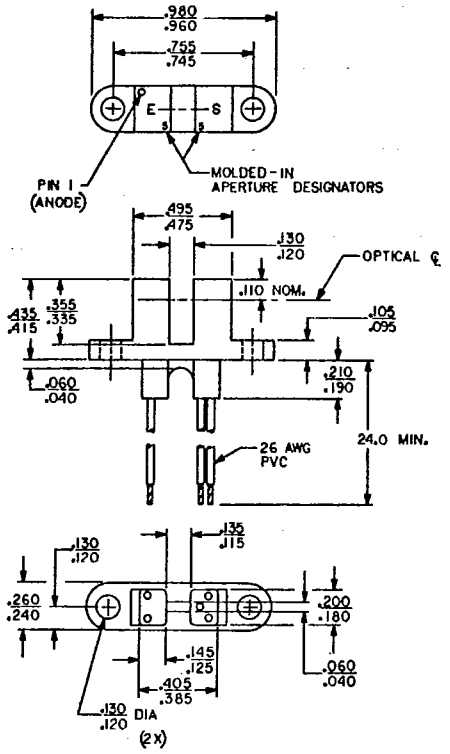
EXAMPLE

KT990N51

- Optek Assembly
- Photo Integrated Circuit Output
- Opaque Polysulfone Discrete Shell With 26 AWG UL1429 Wires 24" Long
- No Tabs
- Buffer with Totem Pole Output
- .050" Aperture in Front of Emitter
- .010" Aperture in Front of Sensor

PACKAGE CONFIGURATION

PACKAGE T



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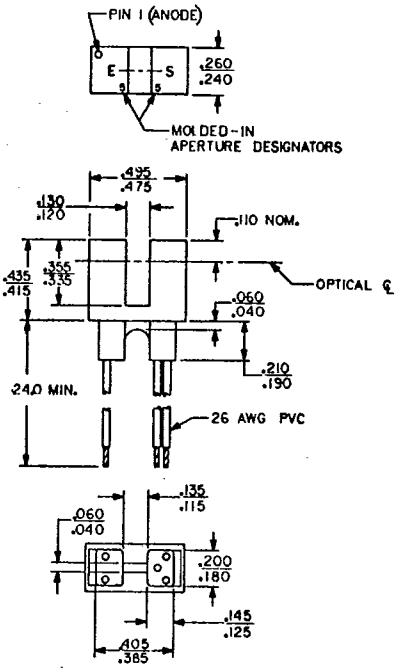

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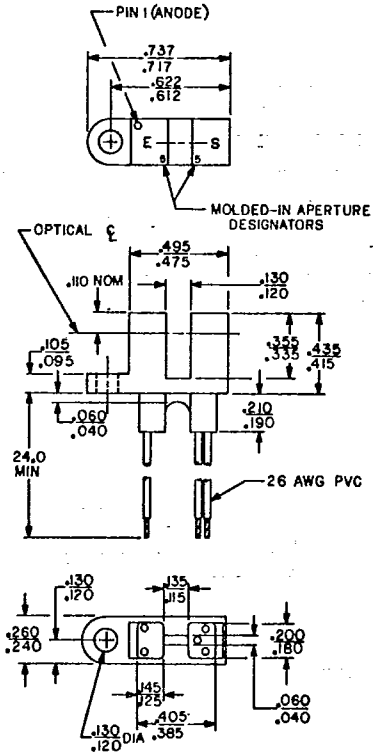

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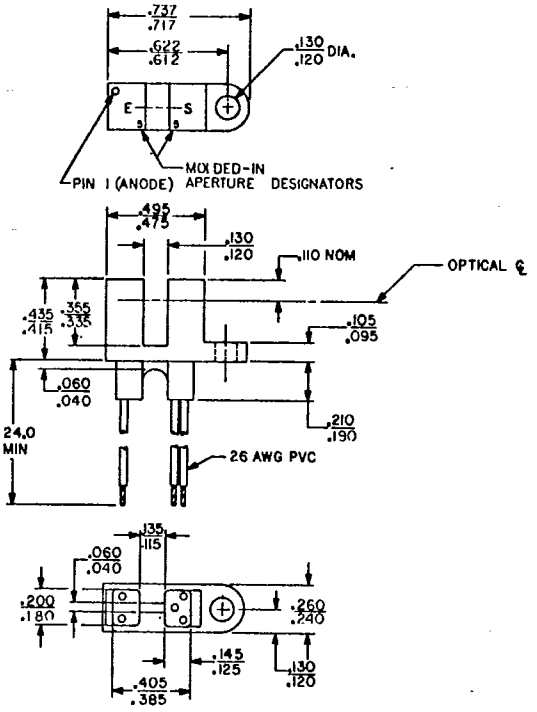


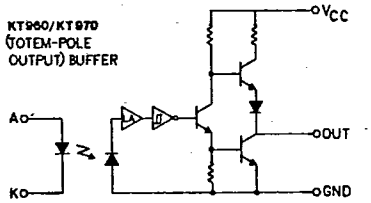
TYPES KT 960/ KT 970/ KT 980 / KT 990 SERIES

ELECTRICAL CHARACTERISTICS (-40°C TO+70°C UNLESS OTHERWISE NOTED)

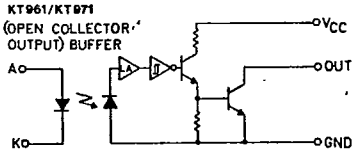
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
INPUT DIODE						
V_F	FORWARD VOLTAGE			1.5	V	I_F=20 mA, T_A=25°C
I_R	REVERSE CURRENT			100	μA	V_R=3 V, T_A=25°C
OUTPUT PHOTO INTEGRATED CIRCUIT SENSOR						
V_{CC}	OPERATING SUPPLY VOLTAGE	4.75		5.25	V	
I_{CCL}	LOW LEVEL SUPPLY CURRENT:					
	BUFFER WITH TOTEM-POLE OUTPUT			15	mA	V_{CC}=5.25V, I_F=0mA(c)
	BUFFER WITH OPEN-COLLECTOR			15	mA	V_{CC}=5.25V, I_F=0 mA(c)
	INVERTER WITH TOTEM-POLE OUTPUT			15	mA	V_{CC}=5.25V, I_F=20 mA
	INVERTER WITH OPEN-COLLECTOR			15	mA	V_{CC}=5.25V, I_F=20mA
I_{CCH}	HIGH LEVEL SUPPLY CURRENT:					
	BUFFER WITH TOTEM-POLE OUTPUT			15	mA	V_{CC}=5.25V, I_F=20mA
	BUFFER WITH OPEN-COLLECTOR			15	mA	V_{CC}=5.25V, I_F=20mA
	INVERTER WITH TOTEM-POLE OUTPUT			15	mA	V_{CC}=5.25V, I_F=0 mA(c)
	INVERTER WITH OPEN-COLLECTOR			15	mA	V_{CC}=5.25V, I_F=0 mA(c)
V_{OL}	LOW LEVEL OUTPUT VOLTAGE					
	BUFFER WITH TOTEM-POLE OUTPUT			0.4	V	V_{CC}=4.75 V, I_{OL}=12.8mA, I_F=0mA(c)
	BUFFER WITH OPEN-COLLECTOR			0.4	V	V_{CC}=4.75 V, I_{OL}=12.8mA, I_F=0mA(c)
	INVERTER WITH TOTEM-POLE			0.4	V	V_{CC}=4.75 V, I_{OL}=12.8mA, I_F=20mA
	INVERTER WITH OPEN-COLLECTOR			0.4	V	V_{CC}=4.75 V, I_{OL}=12.8mA, I_F=20mA
V_{OH}	HIGH LEVEL OUTPUT VOLTAGE					
	BUFFER WITH TOTEM-POLE	2.4			V	V_{CC}=4.75 V, I_{OH}=800μA, I_F=20mA
	INVERTER WITH TOTEM-POLE	2.4			V	V_{CC}=4.75 V, I_{OH}=800μA, I_F=0mA(c)
I_{OH}	HIGH LEVEL OUTPUT CURRENT					
	BUFFER WITH OPEN-COLLECTOR			100	μA	V_{CC}=4.75 V, V_{OH}=30 V, I_F=20mA
	INVERTER WITH OPEN-COLLECTOR			100	μA	V_{CC}=4.75 V, V_{OH}=30V, I_F=0mA, T_A=25°C
I_F (+)	LED POSITIVE-GOING THRESHOLD CURRENT			20	mA	V_{CC}=5V
I_F(+) I_F(-)	HYSTERESIS		2			V_{CC}=5V
I_{OS}	SHORT CIRCUIT OUTPUT CURRENT					
	BUFFER WITH TOTEM-POLE	-30		-100	mA	V_{CC}=5.25V, I_F=20mA, OUTPUT=GND
	INVERTER WITH TOTEM-POLE	-30		-100	mA	V_{CC}=5.25V, I_F=0 mA, OUTPUT=GND
T_R, T_F	OUTPUT RISE TIME OUTPUT FALL TIME			70	NS	V_{CC}=5V, T_A=25°
T_{PLH}, T_{PHL}	PROPAGATION DELAY LOW-HIGH & HIGH-LOW			5	μs	I_F=0 OR 20 mA, R_L=8 TTL LOADS [TOTEM POLE], R_L=360 Ω [OPEN COLLECTOR]

SCHEMATICS

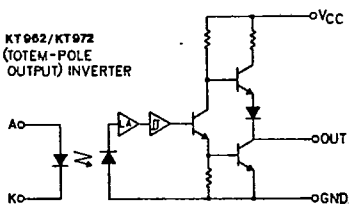
KT960/KT970 (TOTEM-POLE OUTPUT) BUFFER



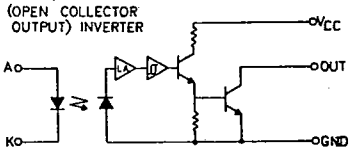
KT961/KT971 (OPEN COLLECTOR OUTPUT) BUFFER



KT962/KT972 (TOTEM-POLE OUTPUT) INVERTER



KT963/KT973 (OPEN COLLECTOR OUTPUT) INVERTER



5

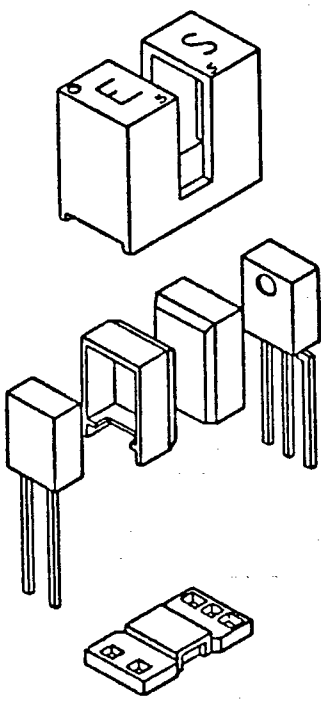
absolute maximum ratings (25 °C unless otherwise noted)

Supply Voltage, V_{CC} (not to exceed 3 seconds) ..... + 10V
Storage Temperature Range ..... − 40 °C to + 100 °C
Operating Temperature Range ..... − 40 °C to + 70 °C
Lead Soldering Temperature (1/16 inch [1.6 mm] from case for 5 sec. with soldering iron)[A] ..... 240 °C

Input Diode Power Dissipation ..... 100mW[B]
Output Photologic Power Dissipation ..... 200mW[D]
Total Device Power Dissipation ..... 300mW[E]
Voltage at Output Lead (Open Collector Output) 35V
Diode { Forward D.C. Current 40mA
Diode { Reverse D.C. Voltage 3V

Notes: (A) RMA flux is recommended. Duration can be extended to 10 sec. max. when wave soldering.
(B) Derate linearly 1.33 mW/°C above 25 °C.
(C) Normal application would be with light source blocked, simulated by I_F = 0.
(D) Derate linearly 2.67 mW/°C above 25 °C.
(E) Derate linearly 4.0 mW/°C above 25 °C.

MECHANICAL CONSTRUCTION



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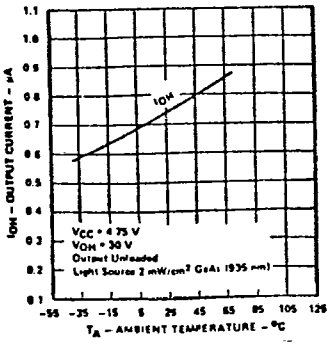
6

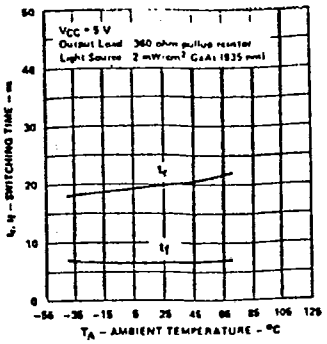
TYPICAL PERFORMANCE CURVES

KT961, KT963, KT971, KT973

Output Current (High) vs. Ambient Temperature

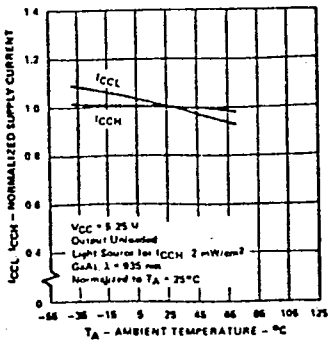


Rise Time and Fall Time vs. Ambient Temperature



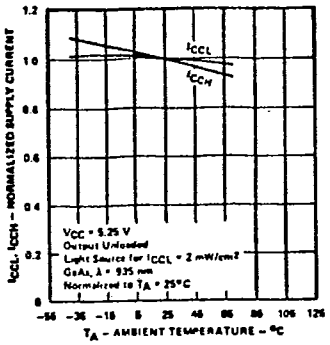
KT960, KT961, KT970, KT971

Normalized Supply Current vs. Ambient Temperature



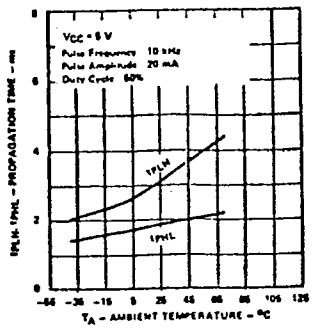
KT962, KT963, KT972, KT973

Normalized Supply Current vs. Ambient Temperature

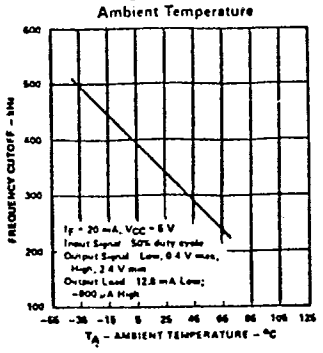


ALL ASSEMBLIES

Propagation Time vs. Ambient Temperature

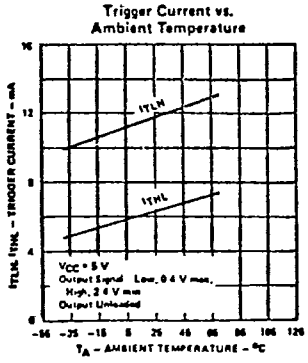


Data Rate vs. Ambient Temperature

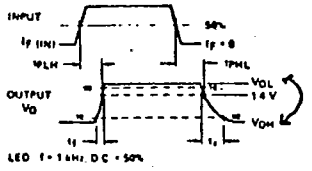


ALL ASSEMBLIES

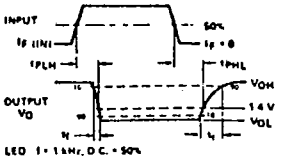
Trigger Current vs. Ambient Temperature



Switching Test Curve for Buffers

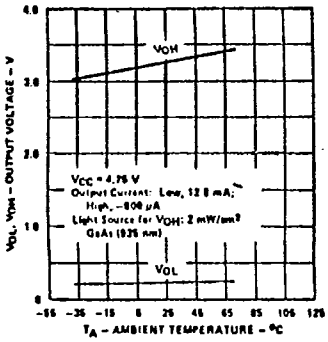


Switching Test Curve for Inverters



KT960, KT962, KT970, KT972

Output Voltage vs. Ambient Temperature



Short Circuit Output Current vs. Ambient Temperature