OPIA4N35, OPIA5010, OPIA4N33
OPIA2110, OPIA2210, OPI6010
DIP Package

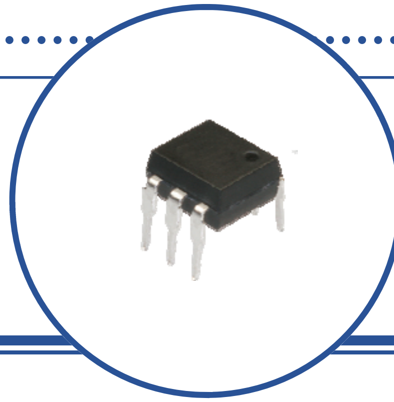
TT electronics
OPTEK Technology

Features:

- 3,750 or 5,000 Vrms electrical isolation
- Choice of a Single and Dual LED
- Phototransistor or Photodarlington Sensor
- Low-cost plastic Dual-In-Line (DIP) package

Agency Approvals:

- UL Certification No: E58730
- VDE No: 40026624,40026625



Description:

The OPIA series optocouplers are designed for applications that use an analog output (Phototransistor or Photodarlington) in a dual-in-line package. A wide selection of configurations are available. With typical isolation voltage of 3,750 or 5,000 Volts(RMS), these product meet typical power system isolation requirements.

Theory of operation: The LED transmitter is used to illuminate the Photosensor providing electrical isolation between two power systems while maintaining the ability to transmit information from one power system to the other. In many applications, analog signal levels may be required to be transmitted between two power systems while maintaining isolation between the power systems up to 5,000 Volts(RMS). A variety of LED and photosensor configurations are available depending on the system requirements.

The ratio Current Transfer Ratio (CTR) is determined using the output current and input current for analog photosensors. CTR ratios can range from as low as 5 to over 9,000 depending on the device.

$$CTR = \frac{Photosensor - Current}{LED - Current} = \frac{20mA}{10mA} * 100 = 200$$

All DIP product is shipped in a shipping tube with “TU” identified on the end of the part number.

Example: OPI4N35DTUE is a 6-Pin DIP shipped in a tube (TU).

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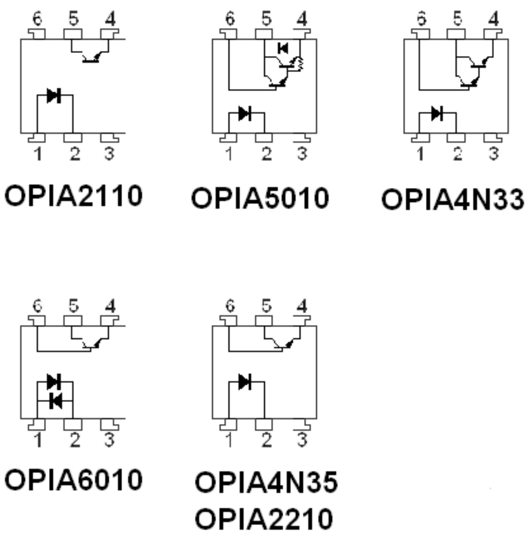
Applications:

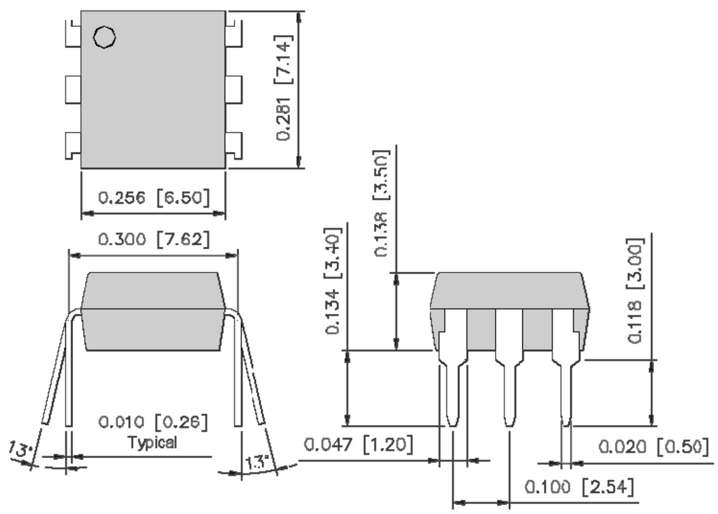
- High voltage isolation
- PCBoard power system isolation
- Industrial equipment power isolation
- Medical equipment power isolation
- Office equipment

RoHS

OPTEK reserves the right to make changes at any time in order to improve design and to supply the best product possible.

Package Outline Dimensions and Schematics: Top-View





Part Number	Pin #					
	1	2	3	4	5	6
OPIA4N35	A	K		E	C	B
OPIA5010	A	K		E	C	B
OPIA3N33	A	K		E	C	B
OPIA2210	A	K		E	C	B
OPIA6010	A-K	K-A		E	C	B
OPIA2110	A	K		E	C	

Symbol	Definition	Symbol	Definition	Symbol	Definition	Symbol	Definition
A	Anode	B	Base	C	Collector	E	Emitter

Analog Output Devices Ordering Information

Part Number	Isolation Voltage Max. (Vrms)	CTR Min/Typ/Max	Typ. Tr / Tf (µs) R_L = 100 ohms	Package	Configuration
OPIA4N35D	5,000	60 / - / 600	5 / 4	6 Pin DIP	A K—B C E
OPIA5010D	5,000	600 / - / 9,000	60 / 50	6 Pin DIP	A K—B C E (Dar)
OPIA3N33D	5,000	500 / 4,000 / -	5 / 60	6 Pin DIP	A K—B C E (Dar)
OPIA2210D	5,000	50 / - / 600	2 / 3	6 Pin DIP	A K—B C E
OPIA6010D	5,000	50 / - / 600	2 / 3	6 Pin DIP	A K, K A—B C E
OPIA2110D	5,000	40 / - / 400	4 / 3	6 Pin DIP	A K—C E
Configuration: Definition of Terms LED Identification—Sensor Identification					
Configuration Information	LED	A = Anode	K = Cathode		
	Sensor	B = Base	C = Collector	E = Emitter	
Packaging	Part Number Suffix: **TU** = Ship in Tubes				**Example:** OPI4N35DTUE

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Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)

Storage Temperature	-55° C to +125° C
Operating Temperature OPIA4N35, OPIA5010, OPIA3N33 OPIA2210, OPIA6010, OPIA2110	 -30° C to +100° C -55° C to +125° C
Isolation voltage (1 minute)	5,000 Vrms
Total Package Power Dissipation	200 mW
Lead Soldering Temperature (1/16" (1.6 mm) from case for 5 seconds with soldering iron)	260° C

Input Diode

Continuous Forward Current	50 mA
Peak Forward current (1 µs pulse width, 300 pps)	1 A
Reverse Voltage	6 V
Power Dissipation	70 mW

Output Phototransistor

Collector-Emitter Voltage OPIA4N35, OPIA6010, OPIA2110 OPIA2210 OPIA5010 OPIA3N33	 60 V 350 V 300 V 30 V
Emitter-Collector Voltage OPIA4N35, OPIA2110 OPIA2210, OPIA6010 OPIA5010, OPIA3N33	 6 V 7 V -
Collector Current OPIA4N35, OPIA2210, OPIA6010, OPIA2110 OPIA5010, OPIA3N33	 50 mA 150 mA
Power Dissipation OPIA4N35, OPIA2110 OPIA5010, OPIA3N33, OPIA2210, OPIA6010	 150 mW 200 mW

Electrical Characteristics (OPIA6 _ _ Series)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode						
V_F	Forward Voltage OPIA4N35, OPIA5010, OPIA3N33, OPI604, OPIA2110 OPIA2210	- 1.0	1.2 1.2	1.4 1.3	V	I_F = 20 mA I_F = 10 mA
V_{FM}	Peek Forward Voltage OPIA4N35, OPIA5010, OPIA3N33, OPI604 OPIA2210, OPIA2110	- -	- -	3.5 3.0	V	I_{FM} = 500 mA
I_R	Reverse Current OPIA4N35, OPIA5010, OPIA3N33, OPI604, OPIA2110 OPIA2210	- -	- -	10 10	µA	V_R = 4 V V_R = 5 V
C_t	Terminal Capacitance OPIA4N35, OPIA5010, OPIA3N33, OPI604, OPIA2110 OPIA2210	- -	30 30	- -	pf	V = 0.0 V, f = 1K Hz V = 0.0 V, f = 1M Hz
Output Phototransistor—OPI4N35D, OPIA2210D, OPIA6010D, OPIA2210D						
I_{CEO}	Collector dark Current OPIA4N35, OPIA6010, OPIA2110 OPIA2210	- -	- 10	100 200	nA	I_F = 0 mA, V_{CE} = 20 V I_F = 0 mA, V_{CE} = 300 V
V_{CEO}	Collector-emitter Saturation Voltage OPIA4N35, OPIA6010, OPIA2110 OPIA2210	- -	0.1 -	0.3 0.4	V	I_F = 20 mA, I_C = 1 mA I_F = 8 mA, I_C = 2.4 mA
f_C	Cutt-Off frequency	-	80	-	K Hz	V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω
t_R	Rise Time OPIA4N35, OPIA6010 OPIA2210 OPIA2110	- - -	5 2 4	20 - 20	µs	V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω V_{CC} = 10 V, I_C = 2 mA, R_L = 100 Ω V_{CC} = 2 V, I_C = 2 mA, R_L = 100 Ω
t_F	Fall Time OPIA4N35, OPIA6010 OPIA2210 OPIA2110	- - -	4 3 3	20 - 20	µs	V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω V_{CC} = 10 V, I_C = 2 mA, R_L = 100 Ω V_{CC} = 2 V, I_C = 2 mA, R_L = 100 Ω

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Electrical Characteristics (OPIA6 _ _ Series) - Continued from Previous Page

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Output PhotoDarlington—OPIA5010D, OPIA3N33D						
I_{CEO}	Collector dark Current OPIA5010 OPIA3N33	- -	- -	1.0 0.1	µA	I_F = 0 mA, V_{CE} = 200 V I_F = 0 mA, V_{CE} = 10 V
V_{CEO}	Collector-emitter Saturation Voltage OPIA5010 OPIA3N33	- -	- -	1.5 1.0	V	I_F = 20 mA, I_C = 5 mA I_F = 8 mA, I_C = 2 mA
f_C	Cutt-Off frequency OPIA5010, OPIA3N33	-	7.0	-	K Hz	V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω
t_R	Rise Time OPIA5010 OPIA3N33	- -	60 5	300 40	µs	V_{CC} = 2 V, I_C = 20 mA, R_L = 100 Ω V_{CC} = 10 V, I_C = 50 mA, R_L = 100 Ω
t_F	Fall Time OPIA5010 OPIA3N33	- -	50 60	250 100	µs	V_{CC} = 2 V, I_C = 20 mA, R_L = 100 Ω V_{CC} = 10 V, I_C = 50 mA, R_L = 100 Ω
Coupled Characteristics—OPIA6XXX Series						
CTR	Current Transfer Ratio OPIA4N35 OPIA5010 OPIA3N33 OPIA2210 OPIA6010 OPIA2110	60 600 500 50 60 40	- - 4,000 - - -	600 9,000 - 600 600 400	%	I_F = 2 mA, V_{CE} = 5.0 V I_F = 2 mA, V_{CE} = 5.0 V I_F = 10 mA, V_{CE} = 10.0 V I_F = 5 mA, V_{CE} = 5.0 V I_F = 1 mA, V_{CE} = 5.0 V I_F = 10 mA, V_{CE} = 5.0 V
C_f	Floating Capacitance	-	0.6	1.0	pF	V = 0.0 V, f = 1M Hz
R_{ISO}	Isolation resistance	$5X10^{10}$	10^{11}	-	ohm	DC500V

OPI4N35

Fig.1 Current Transfer Ratio vs. Forward Current

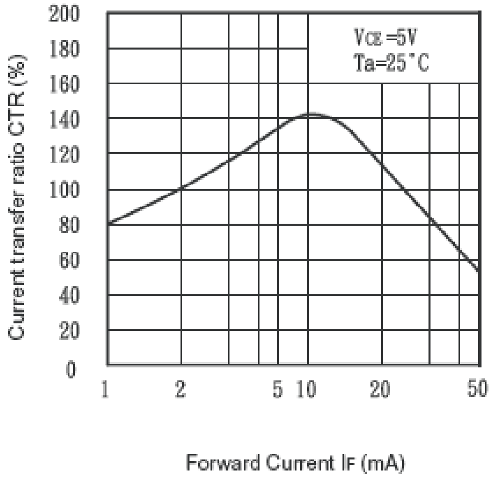


Fig.2 Collector Power Dissipation vs. Ambient Temperature

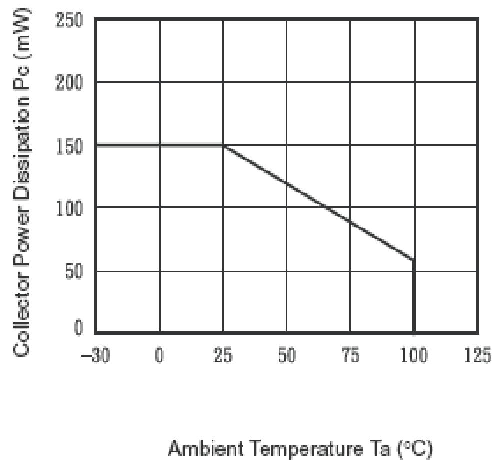


Fig.3 Collector Dark Current vs. Ambient Temperature

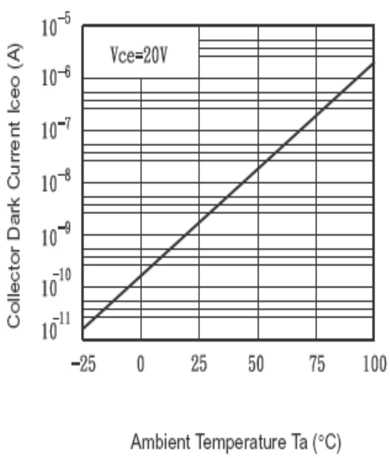


Fig.4 Forward Current vs. Ambient Temperature

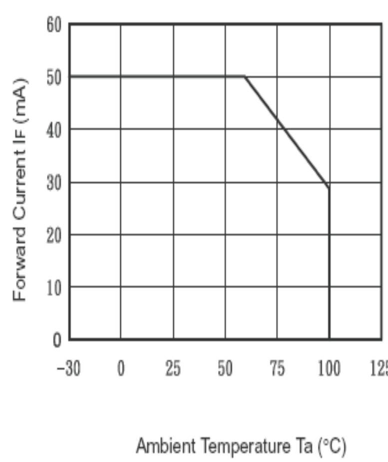
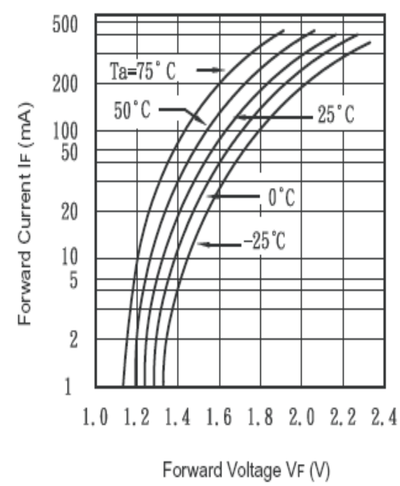


Fig.5 Forward Current vs. Forward Voltage



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OPI4N35

Fig.6 Collector Current vs. Collector-emitter Voltage

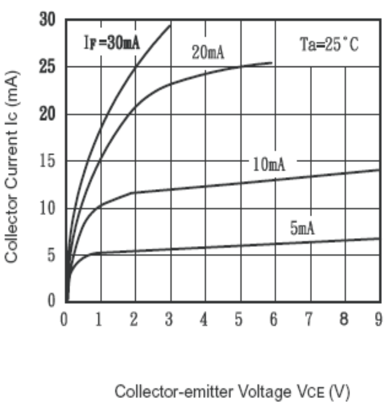


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

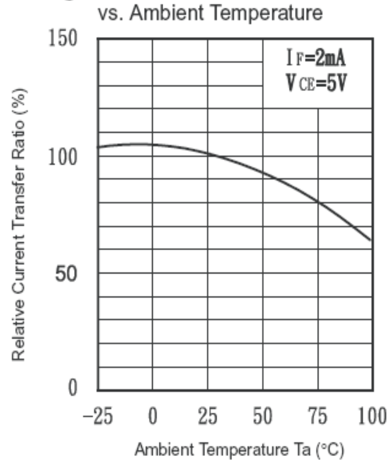


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

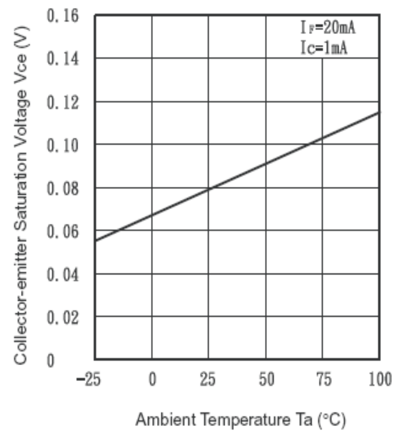


Fig.9 Collector-emitter Saturation Voltage vs. Forward Current

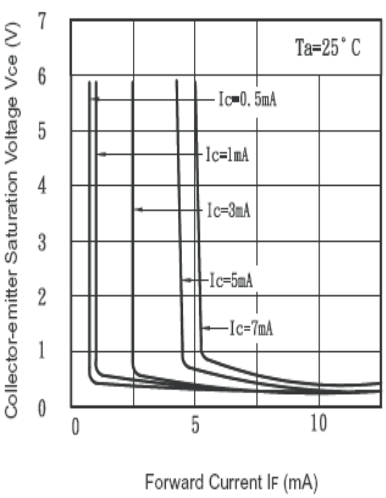


Fig.10 Response Time vs. Load Resistance

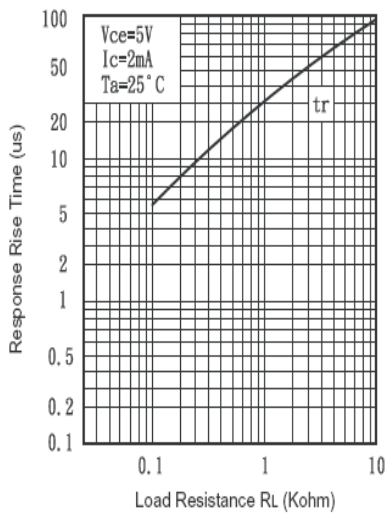
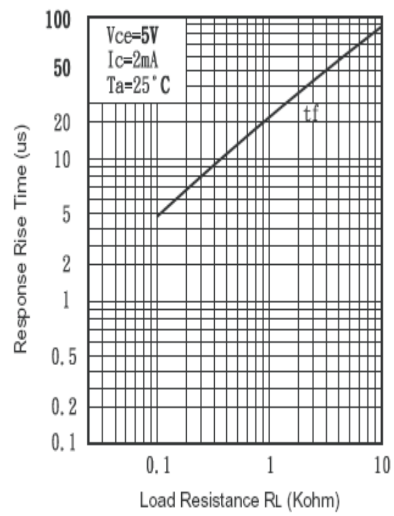


Fig.11 Response Time vs. Load Resistance



OPIA5010

Fig. 4 Forward Current vs. Ambient Temperature

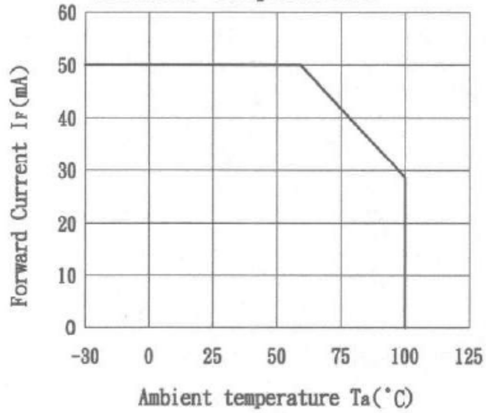


Fig. 5 Forward Current vs. Forward Voltage

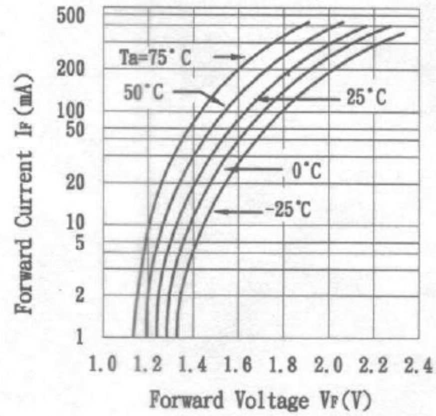


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

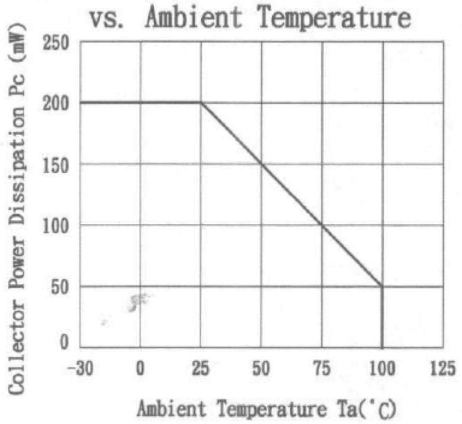


Fig. 3 Collector Dark Current vs. Ambient Temperature

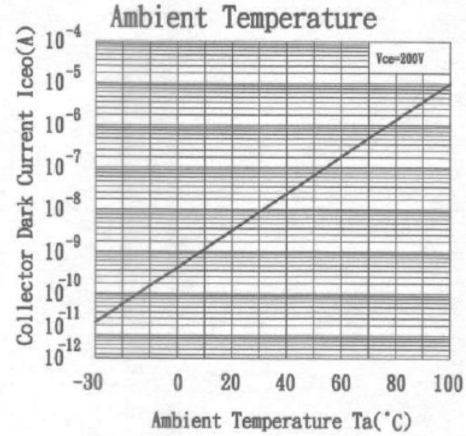


Fig. 6 Collector Current vs. Collector-emitter Voltage

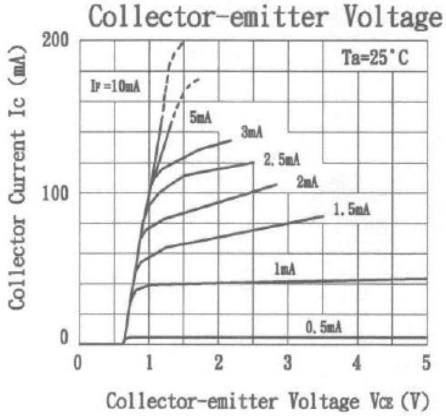
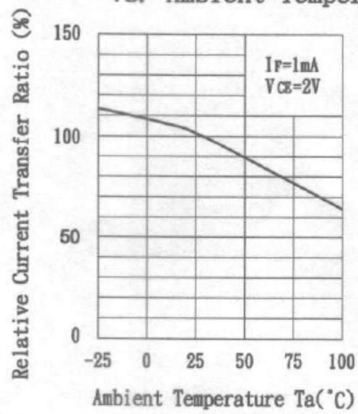


Fig. 7 Relative Current Transfer Ratio vs. Ambient Temperature



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OPIA5010

Fig. 1 Current Transfer Ratio vs. Forward Current

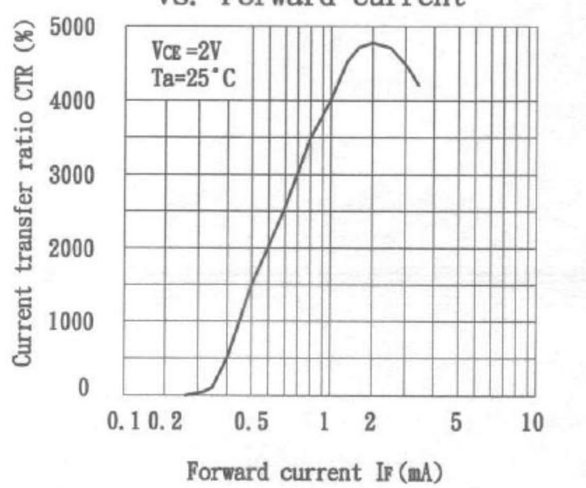


Fig. 8 Collector-emitter Saturation Voltage vs. Forward Current

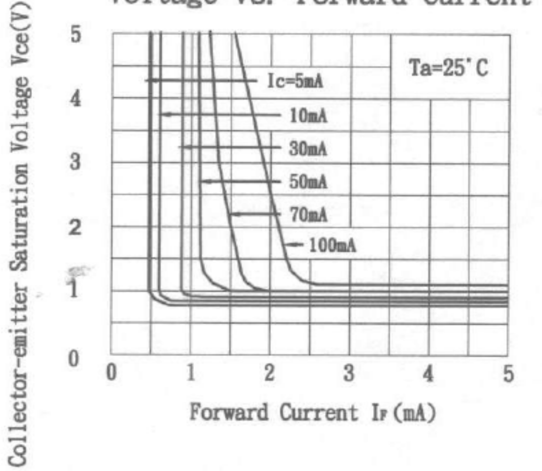
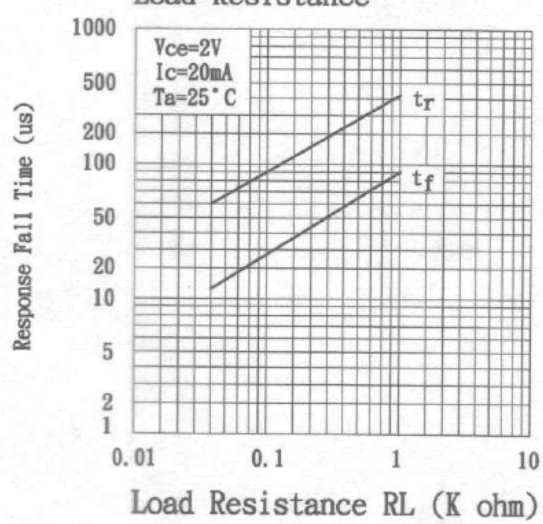


Fig. 9 Response Time vs. Load Resistance



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OPIA3N33

Fig. 1 Forward Current vs. Ambient Temperature

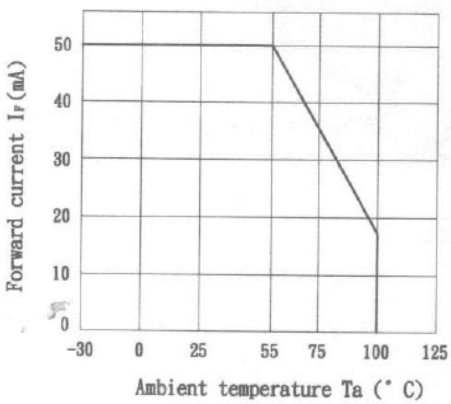


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

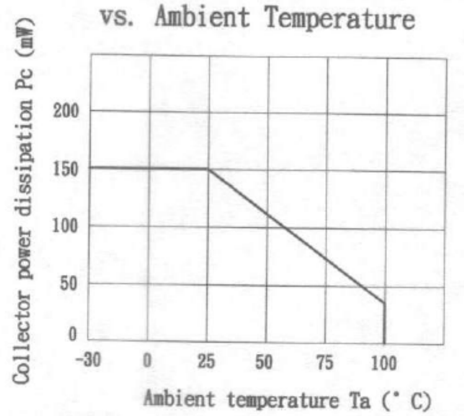


Fig. 3 Peak Forward Current vs. Duty Ratio

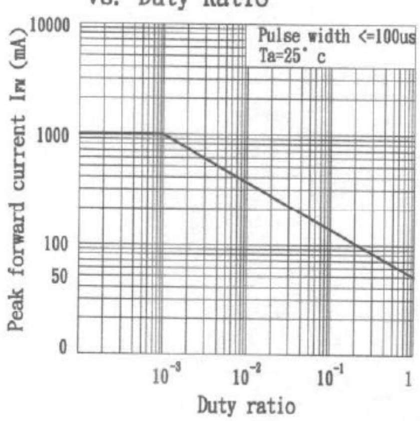


Fig. 4 Forward Current vs. Forward Voltage

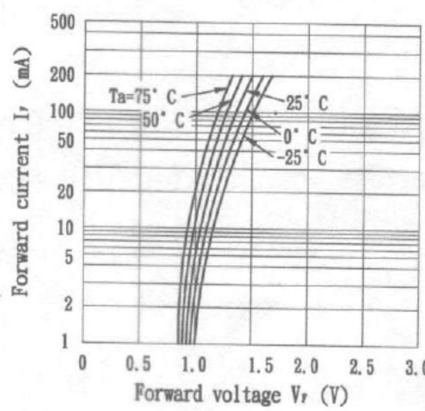


Fig. 5 Current Transfer Ratio vs. Forward Current

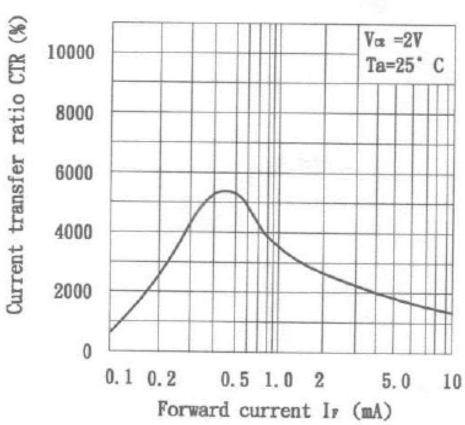
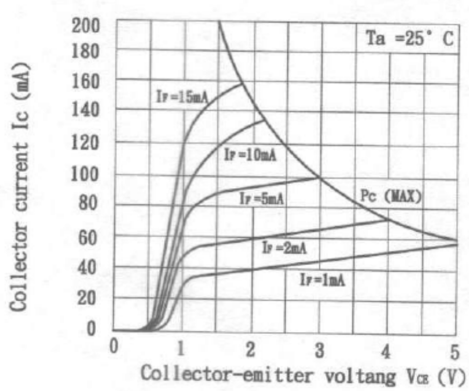


Fig. 6 Collector Current vs. Collector-emitter Voltage



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OPIA3N33

Fig. 11 Collector-emitter Saturation Voltage vs. Forward current

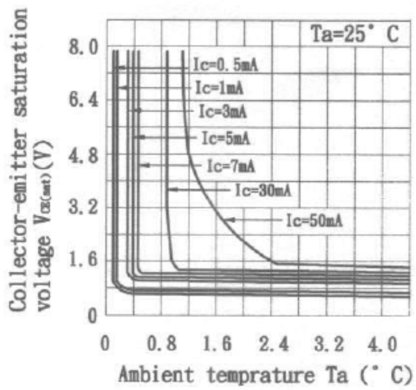


Fig. 7 Relative Current Transfer Ratio vs. Ambient Temperature

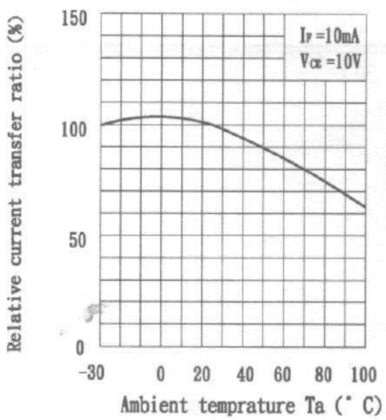


Fig. 8 Collector-emitter Saturation Voltage vs. Ambient Temperature

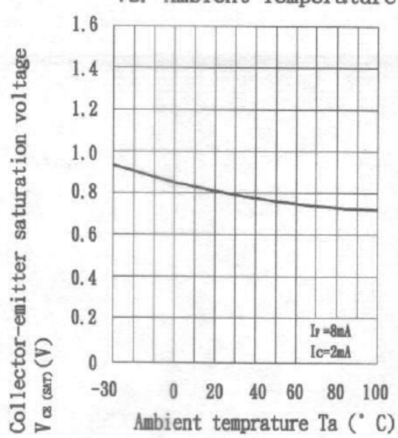


Fig. 9 Collector Dark Current vs. Ambient Temperature

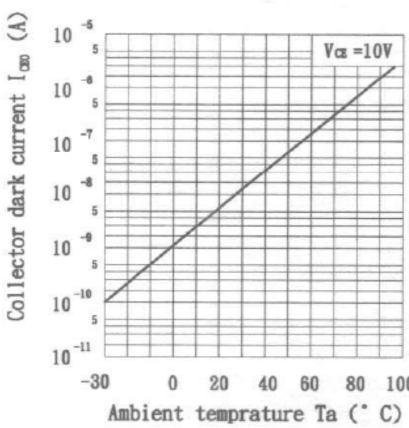
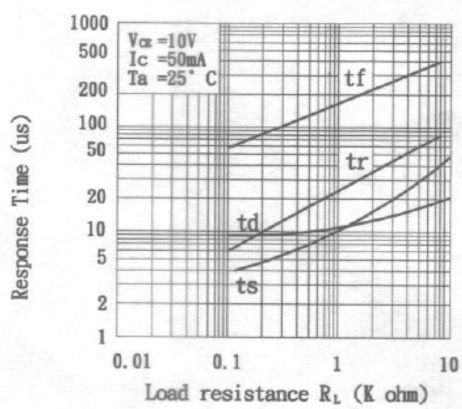


Fig. 10 Response Time vs. Load Resistance



OPIA2210

Fig. 1 Current Transfer Ratio Vs. Forward Current

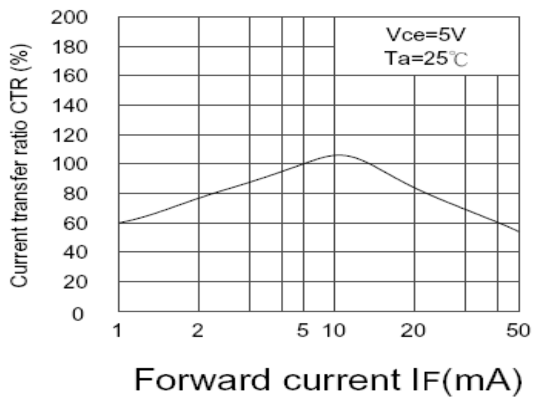


Fig.2 Collector Power Dissipation vs. Ambient Temperature

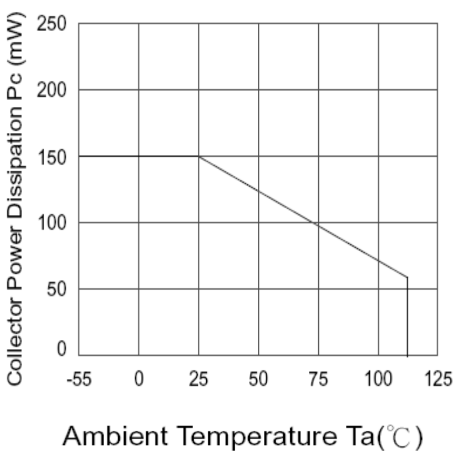


Fig.3 Collector Dark Current vs. Ambient Temperature

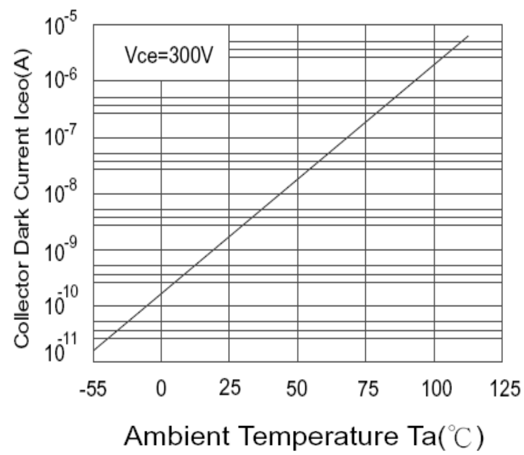


Fig.4 Forward Current vs. Ambient Temperature

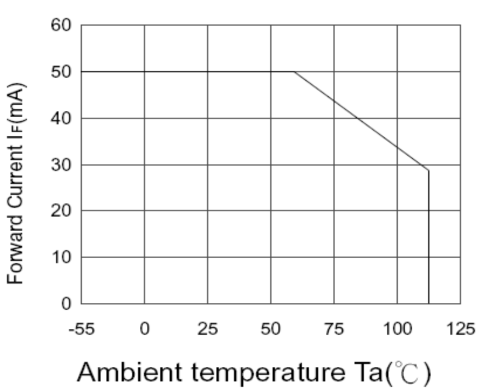
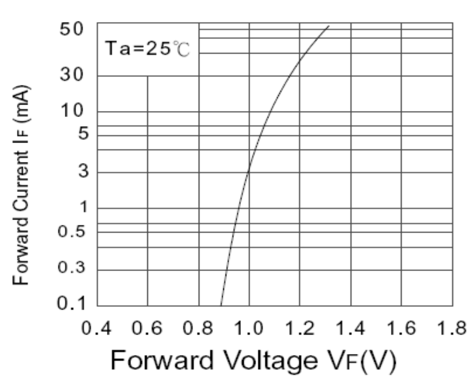


Fig.5 Forward Current vs. Forward Voltage



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OPIA2210

Fig.6 Collector Current vs. Collector-emitter Voltage

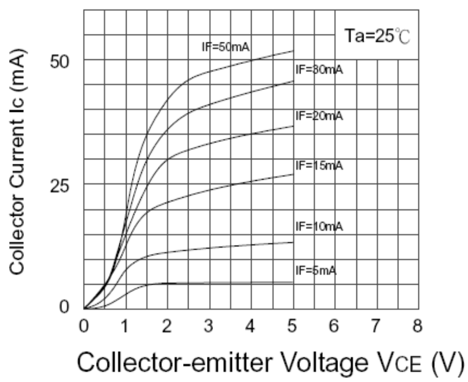


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

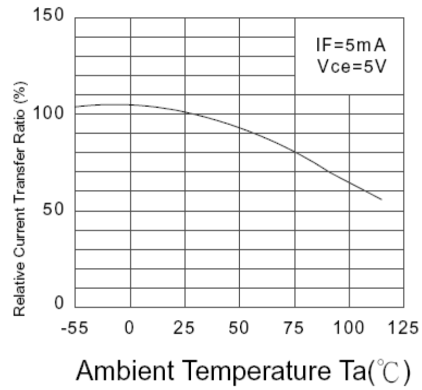


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

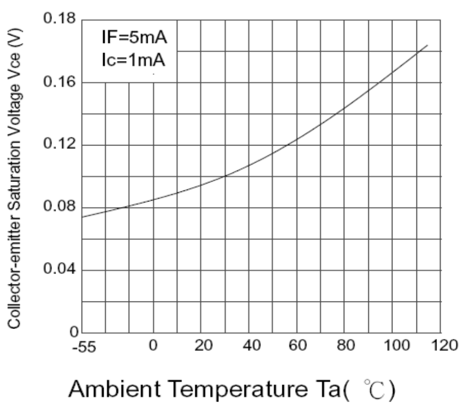


Fig.9 Collector-emitter Saturation Voltage vs. Forward Current

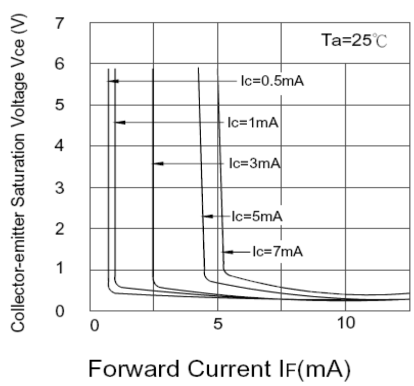


Fig.10 Response Time vs. Load Resistance

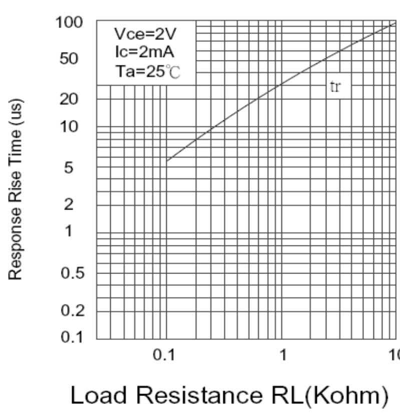
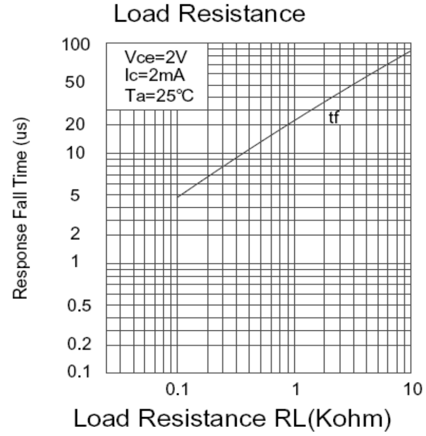


Fig.11 Response Time vs. Load Resistance



OPIA6010

Fig.1 Current Transfer Ratio vs. Forward Current

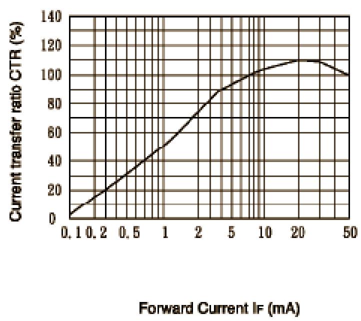


Fig.2 Collector Power Dissipation vs. Ambient Temperature

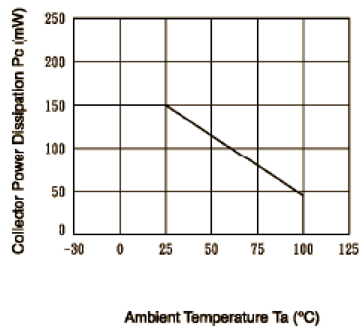


Fig.3 Collector Dark Current vs. Ambient Temperature

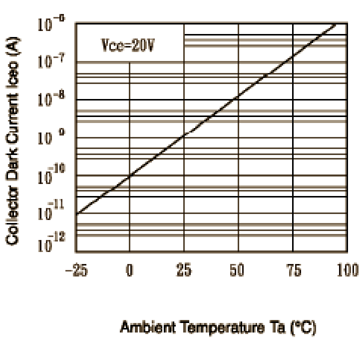


Fig.4 Forward Current vs. Ambient Temperature

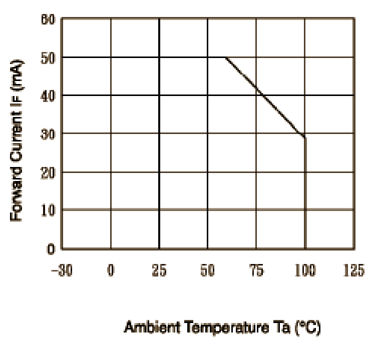


Fig.5 Forward Current vs. Forward Voltage

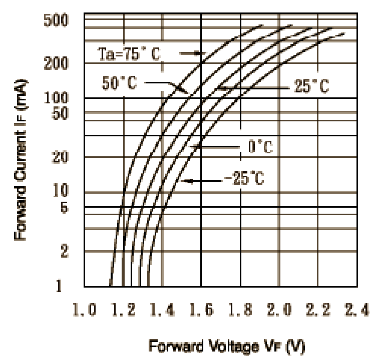


Fig.6 Collector Current vs. Collector-emitter Voltage

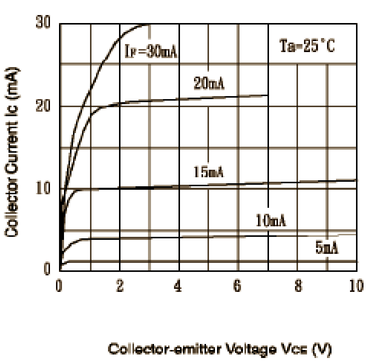


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

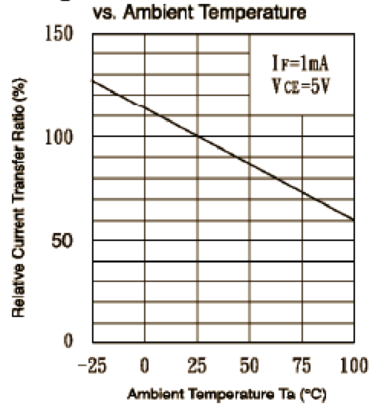
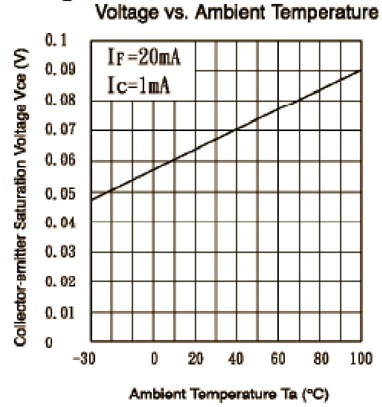


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature



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OPIA6010

Fig.9 Collector-emitter Saturation Voltage vs. Forward Current

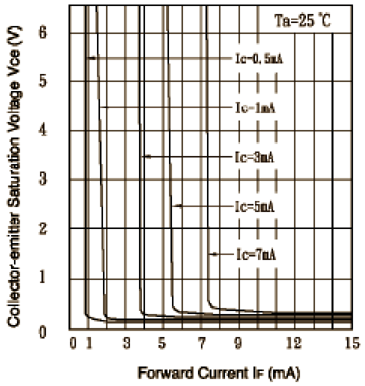


Fig.10 Response Time vs. Load Resistance

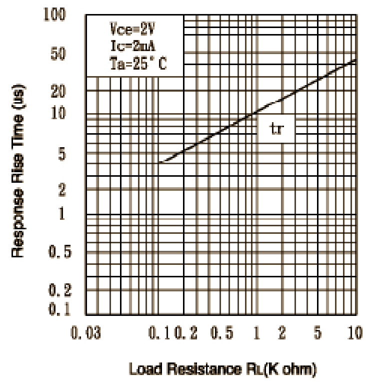
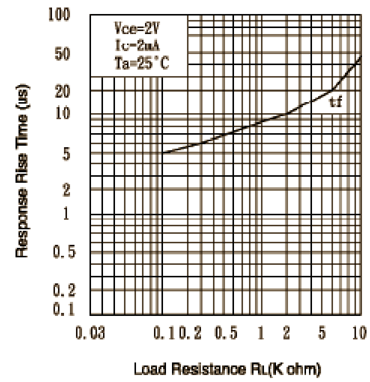


Fig.11 Response Time vs. Load Resistance



OPIA2210

Fig.1 **Current Transfer Ratio vs. Forward Current**

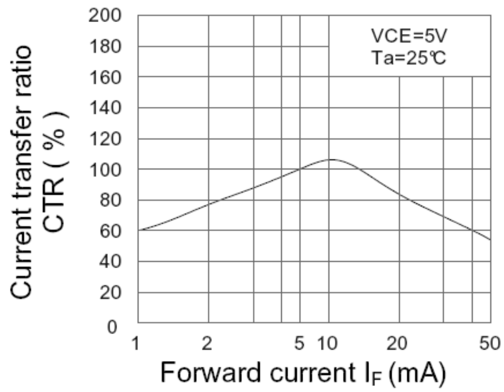


Fig.2 **Collector Power Dissipation vs. Ambient Temperature**

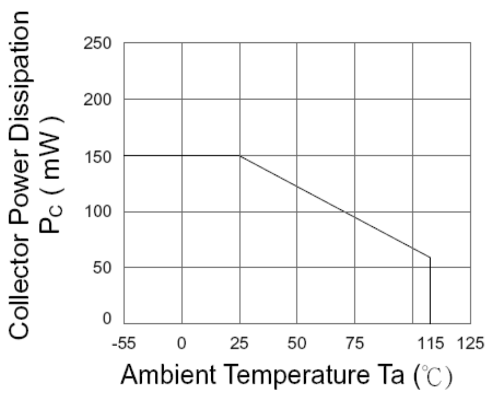


Fig.3 **Collector Dark Current vs. Ambient Temperature**

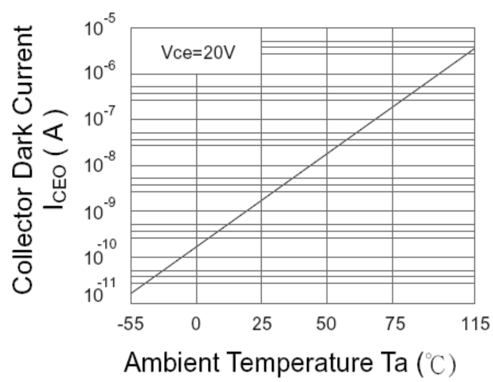


Fig.4 **Forward Current vs. Ambient Temperature**

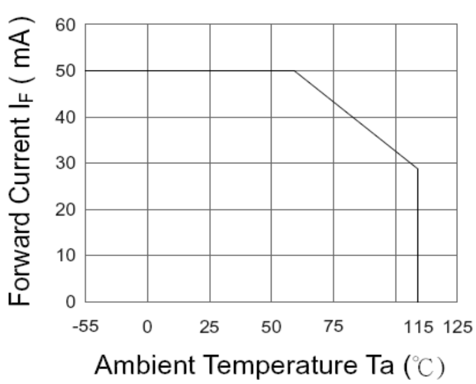


Fig.5 **Forward Current vs. Forward Voltage**

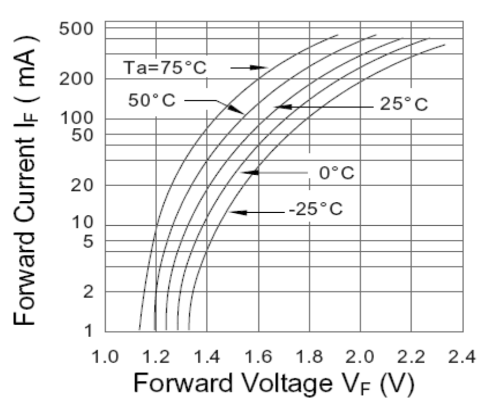


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Fig.6 **Collector Current vs. Collector-Emitter Voltage**

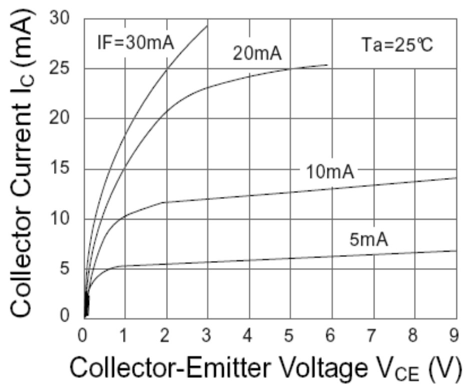


Fig.7 **Relative Current Transfer Ratio vs. Ambient Temperature**

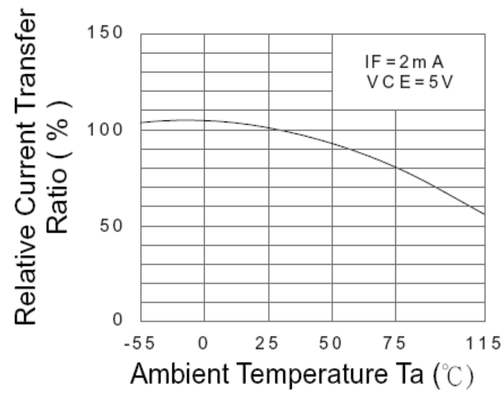


Fig.8 **Collector-Emitter Saturation Voltage vs. Ambient Temperature**

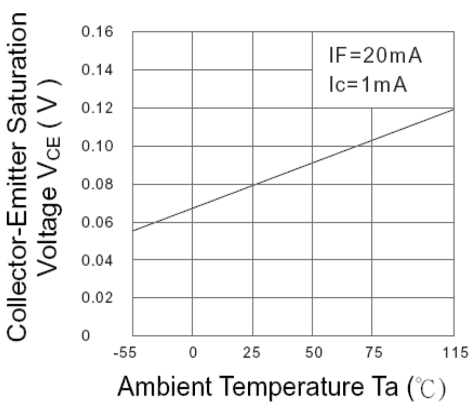


Fig.9 **Collector-Emitter Saturation Voltage vs. Forward Current**

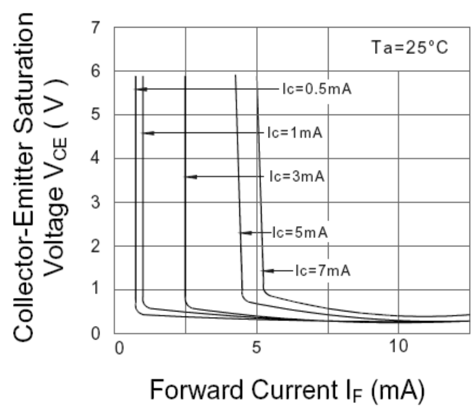


Fig.10 **Response Time vs. Load Resistance**

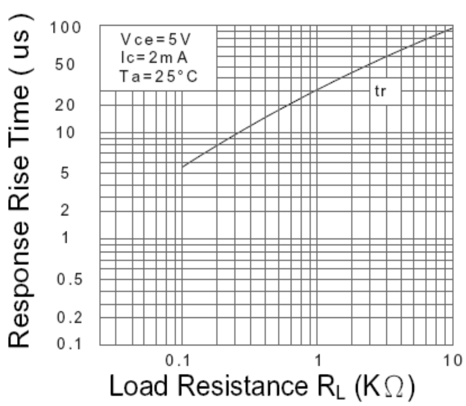
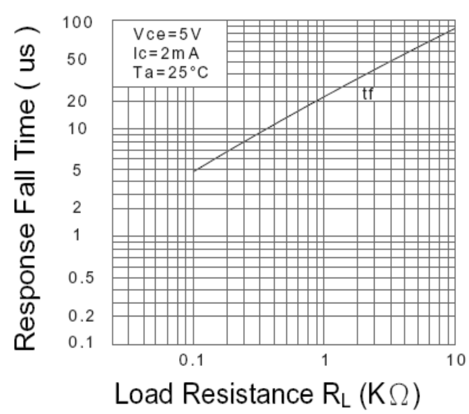


Fig.11 **Response Time vs. Load Resistance**



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Quality / Reliability Requirements

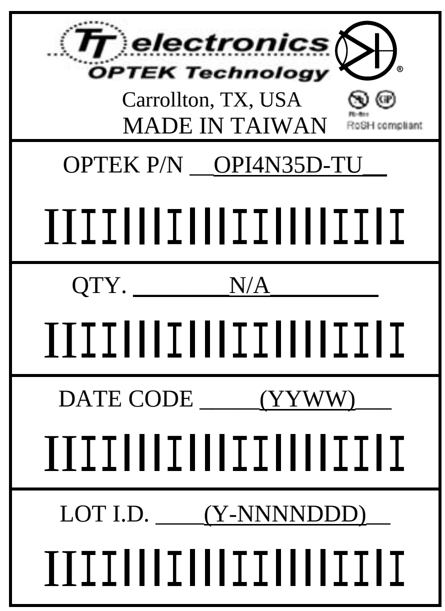
Parameter	Failure Criteria	Conditions
HTRB D $I_{C(OFF)}$	± 10%	11 samples after 500Hrs
	0 Fail	@ VCE = 5.0VDC, Ta = 70°C
HTFB D $I_{C(ON)}$	± 10%	50 samples after 96Hrs
	0 Fail	@ Max P_D, Ta = 25°C
MTTF @ 90% confidence	150,000 Min.	@ 25°C, 25mADC
Moisture Sensitivity Level	MSL 1	per JDEC stnd J-STD-020B
Lead Solderability	0 Fail	per Method 208 of MIL-STD-202.
Glass Transition of body	125°C Min.	DSC test method
Temperature Humidity-Bias	± 20%	85°C, 85%RH, 500Hrs, 80% min Iceo
Temperature Cycle	± 20%	per Method 1010.7 of MIL-STD-883E
High Temperature Storage	± 20%	85°C, 500Hrs
Autoclave	0 Fail	T_A = 121°C, Pressure = 15psi, Humidity = 100%, Time = 96Hrs

Note: This is to be performed when a change occurs to form, fit or function.

Government and Industry Standard Compliance Requirements

European Union's Reduction of Hazardous Substances (RoHS) Directive 2002/95/EC

Label Identification



DESCRIPTION:

Size: 3" (7.4 cm) X 2.2" (5.5 cm)
Lettering shall be black on white background.
Format shall be as:

Notes:
1. The DATE CODE is a 4-digit code for date of manufacture where YY is the last two digits of the year, and WW is week number of manufacture.
2. The LOT I.D. is the manufacturing location lot identification where Y is the year of manufacture, NNNN is a sequential lot identifier, and DDD is the day of the year of manufacture. – or use equivalent label format.

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OPTEK Technology

Packaging Information:

Optek's Optocoupler Part Numbers		Tube		Inner		Small Carton			Medium Carton			Large Carton		
	Packaging Quantities			52 x 7 x 7.5 cm		53.5 x 16 x 17.5 cm			53.5 x 30.7 x 17.5 cm			53.5 x 30.7 x 25 cm		
		Qty	Weight	Qty	Weight	Qty	Weight	Gross Weight	Qty	Weight	Gross Weight	Qty	Weight	Gross Weight
P/H and SMD	**4-PIN** OPIA400D/A, OPIA410D/A - OPIA413D/A	100	44	3,000	1.40	12,000	6.0	6.5	24,000	12.0	12.5	36,000	18.0	18.5
	6-PIN OPIA6XXD/A Series	65	44	1,950	1.50	7,800	6.5	7.0	15,600	12.0	12.5	23,400	18.5	19.0
	8-PIN OPIA8XXD Series and OPID804D	48	44	1,440	1.44	5,760	6.0	6.5	11,520	12.0	12.5	17,290	18.0	18.5
M/F SOP	**4-PIN and 5-PIN** OPIA401B - OPIA404B, OPIA414B, OPIA500B	100	24	6,000	1.60	24,000	6.5	7.0	48,000	13.0	13.5	72,000	19.5	20.0
SSOP	**4-PIN** OPIA405C - OPIA409C	170	--	10,200	--									

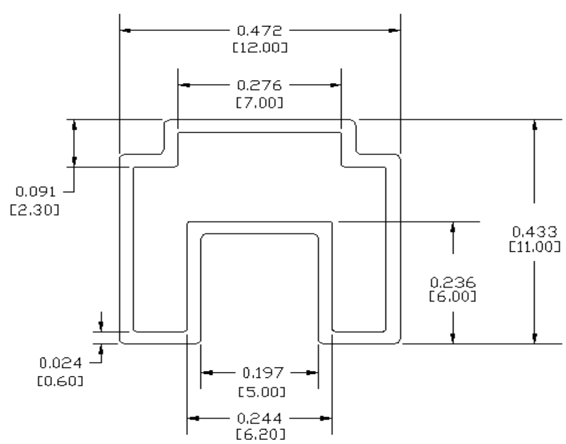
P/H = Pin-Hole Packages (Referred as D = Dual-In-Line Package)

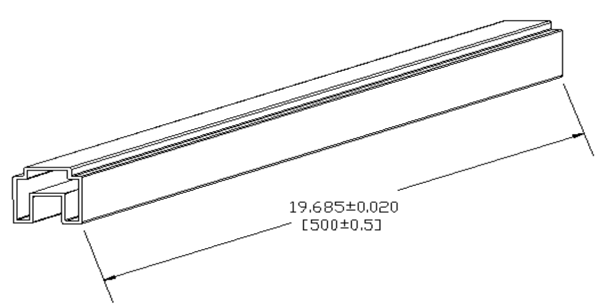
SMD = Standard Surface Mount Packages (Referred as A = 6.5mil SMD)

M/F or SOP = Mini-Flat Packages or Small Outside Packages (Referred as B = 4.40mil SMD w/ 2.54mil Lead-Spacing)

SSOP = Shrink SOP Packages (Referred as C = 3.60mil SMD with 1.27mil Lead-Spacing)

Tube Packaging Specifications (TU):





Quantity: 6-pin: 65pcs/tube