SMARTLAB
PCI BUS 16 CHANNELS RELAY OUTPUT
16 CHANNELS PHOTO ISOLATOR INPUT ADAPTER

OPERATION MANUAL

DECISION
Computer International Co., Ltd.

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CHAPTER 1
INTRODUCTION

The PCI 16 channels relay output / photo isolator input adapter is a 32 bits PCI bus board with Plug and Play (PnP) features, it is a programmable I/O interface card for PC/486, Pentium, or compatibles. The PnP features let hardware configuration for IRQ and I/O address is detected by BIOS automatically, you don't need set switch and jumper.

The PCI 16 channels relay output / photo isolator input adapter provides relay output functions. The relay output part provides 16 relays to drive 16 different output channels. Each relay channel can be used to control ON/ OFF of external devices, to drive external power relays, to activate alarms… etc.

The photo isolator input part provides 16 photo couple digital input channels, which allow the input signals to be completely floated and prevent the ground loop.

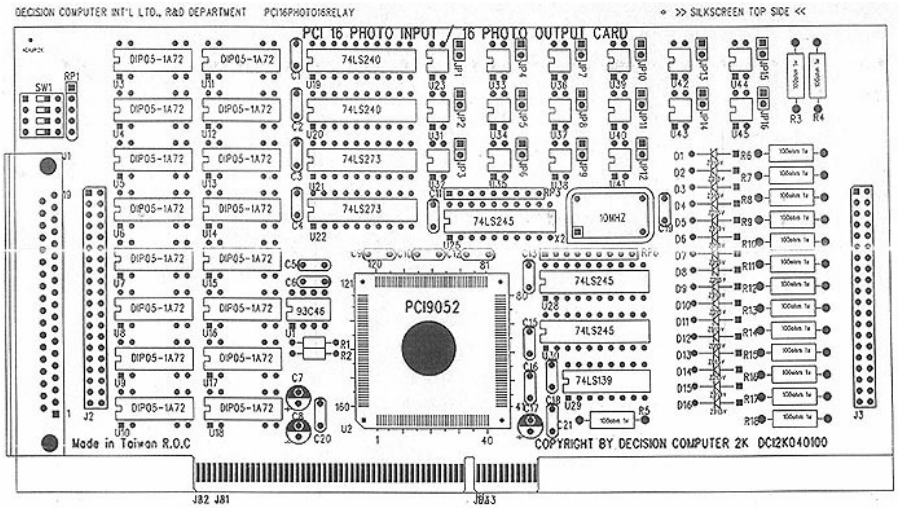
❖ The features of PCI 16 channels relay output / 16 channels photo isolator input adapter are:

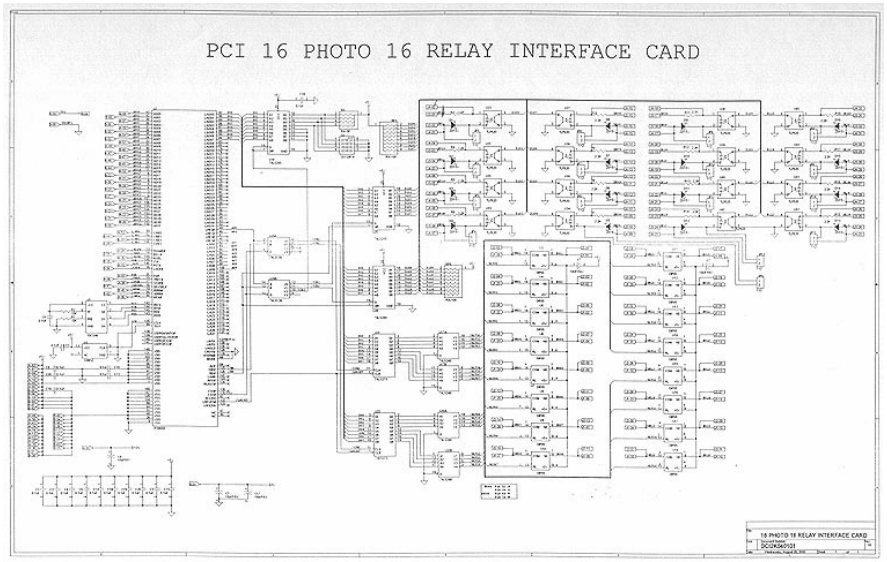
- 32 bits PCI bus with Plug and Play (PnP) features.
- Support 16 relay output channels and 16 photo couple input channels.
- Max contact rating for relay: 70V/AC, 100V/DC 0.25AMP.
- Response time for relay: 1 ms minimum.
- Contact resistance for relay: 0.2 OHM maximum.
- Support several operating modes that are programmable.

- Activation voltage:
  When short jumpers (input range from 0 to 20V)
  0 to 1.5V inactive
  3 to 20V active
  When open jumpers (input range from 0 to 30V)
  0 to 16.6V inactive
  18 to 30V active

❖ PACKAGE CONTENTS:

- SMARTLAB PCI bus 16 channels relay output / 16 channels photo couple input adapter.
- User's manual.
- Warranty form.





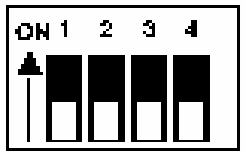
CHAPTER 2

HARDWARE CONFIGURATION

Before you use the PCI 16 channels relay output / 16 channels photo couple input adapter, Please check our technical web site http://www.smatlab.com. Observe the figure in the follows, the proper settings for the PCI 16 channels relay output / 16 channels photo couple input adapter is described in the following.

2.1 Switch and Jumper Settings

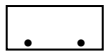
1. Card ID setting



Card No 1 : All OFF
Card No 2 : 1 ON, 2, 3, 4 OFF
Card No 3 : 2 ON, 1, 3, 4 OFF
Card No 4 : 3 ON, 1, 2, 4 OFF

The switch is used to identify card number. Please set card number by card identifier switch, the PCI BIOS will assign pre-allocated I/O address to each adapter. Please set different card number to each adapter (do not duplicate card number setting).

2. JP1 to JP16


JP1

Jumper	Input Range	Inactive Voltage	Active Voltage
Open	0 to 30V	0 to 1.5V	3 to 20V
Short	0 to 20V	0 to 16.5V	18 to 30V

The JP1 is used to select voltage signal opto+ and opto- range of photo couple input channel 1, and the JP2 is used to select voltage signal range of photo input channel 2, …etc. When we short the jumper, the input voltage range is 0 to 20V, and open the jumper means input voltage range is 0 to 30V.

2.2 I/O Address

The PnP feature will get base I/O address automatically, where

Base Address + 0:
Relay output channel 1 to 16

15	14	13	12	11	10	9	8
RL16	RL15	RL14	RL13	RL12	RL11	RL10	RL9

7	6	5	4	3	2	1	0
RL8	RL7	RL6	RL5	RL4	RL3	RL2	RL1

Base Address + 0:
Photo isolator input channel 1 to 16.

15	14	13	12	11	10	9	8
IN16	IN15	IN14	IN13	IN12	IN11	IN10	IN9

7	6	5	4	3	2	1	0
IN8	IN7	IN6	IN5	IN4	IN3	IN2	IN1

2.3 Connector Assignments

1. DB 37 Connector Pin Assignments

Pin	Single	Description
1	NO01	Relay channel 1, Normal open output
2	NO02	Relay channel 2, Normal open output
3	NO03	Relay channel 3 Normal open output
4	NO04	Relay channel 4 Normal open output
5	NO05	Relay channel 5 Normal open output
6	NO06	Relay channel 6 Normal open output
7	NO07	Relay channel 7 Normal open output
8	NO08	Relay channel 8 Normal open output
9	NO09	Relay channel 9 Normal open output
10	NO10	Relay channel 10 Normal open output
11	NO11	Relay channel 11 Normal open output
12	NO12	Relay channel 12 Normal open output
13	NO13	Relay channel 13 Normal open output
14	NO14	Relay channel 14 Normal open output
15	NO15	Relay channel 15 Normal open output
16	NO16	Relay channel 16 Normal open output
17	GND	GND
18	DC + 5V	DC + 5V output
19	DC +12V	DC +12V output
20	COM01	Relay channel 1, COMMON output
21	COM02	Relay channel 2, COMMON output
22	COM03	Relay channel 3, COMMON output
23	COM04	Relay channel 4, COMMON output
24	COM05	Relay channel 5, COMMON output
25	COM06	Relay channel 6, COMMON output
26	COM07	Relay channel 7, COMMON output
27	COM08	Relay channel 8, COMMON output
28	COM09	Relay channel 9, COMMON output
29	COM10	Relay channel 10 COMMON output
30	COM11	Relay channel 11 COMMON output

31	COM12	Relay channel 12 COMMON output
32	COM13	Relay channel 13 COMMON output
33	COM14	Relay channel 14 COMMON output
34	COM15	Relay channel 15 COMMON output
35	COM16	Relay channel 16 COMMON output
36	GND	GND
37	DC + 5V	DC + 5V output

2. 40 Pins Connector J2

Pin	Single	Description
1	NO-01	Relay Ch. 01 - Output
2	COM-01	Relay Ch. 01 - Output
3	NO-02	Relay Ch. 02 - Output
4	COM-02	Relay Ch. 02 - Output
5	NO-03	Relay Ch. 03 - Output
6	COM-03	Relay Ch. 03 - Output
7	NO-04	Relay Ch. 04 - Output
8	COM-04	Relay Ch. 04 - Output
9	NO-05	Relay Ch. 05 - Output
10	COM-05	Relay Ch. 05 - Output
11	NO-06	Relay Ch. 06 - Output
12	COM-06	Relay Ch. 06 - Output
13	NO-07	Relay Ch. 07 - Output
14	COM-07	Relay Ch. 07 - Output
15	NO-08	Relay Ch. 08 - Output
16	COM-08	Relay Ch. 08 - Output
17	NO-09	Relay Ch. 09 - Output
18	COM-09	Relay Ch. 09 - Output
19	NO-10	Relay Ch. 10 - Output
20	COM-10	Relay Ch. 10 - Output
21	NO-11	Relay Ch. 11 - Output
22	COM-11	Relay Ch. 11 - Output
23	NO-12	Relay Ch. 12 - Output
24	COM-12	Relay Ch. 12 - Output

25	NO-13	Relay Ch. 13 - Output
26	COM-13	Relay Ch. 13 - Output
27	NO-14	Relay Ch. 14 - Output
28	COM-14	Relay Ch. 14 - Output
29	NO-15	Relay Ch. 15 - Output
30	COM-15	Relay Ch. 15 - Output
31	NO-16	Relay Ch. 16 - Output
32	COM-16	Relay Ch. 16 - Output
33	GND	
34	GND	
35	DC + 5V	DC + 5V output
36	DC + 5V	DC + 5V output
37	DC + 12V	DC + 12V output
38	DC + 12V	DC + 12V output
39	GND	
40	GND	

3. 40 Pins Connector J3

Pin	Single	Description
1	IN-01-	Opto-isolator Ch. 01 - Input
2	IN-01+	Opto-isolator Ch. 01 + Input
3	IN-02-	Opto-isolator Ch. 02 - Input
4	IN02+	Opto-isolator Ch. 02 + Input
5	IN-03-	Opto-isolator Ch. 03 - Input
6	IN-03+	Opto-isolator Ch. 03 + Input
7	IN-04-	Opto-isolator Ch. 04 - Input
8	IN-04+	Opto-isolator Ch. 04 + Input
9	IN-05-	Opto-isolator Ch. 05 - Input
10	IN-05+	Opto-isolator Ch. 05 + Input
11	IN-06-	Opto-isolator Ch. 06 - Input
12	IN-06+	Opto-isolator Ch. 06 + Input
13	IN-07-	Opto-isolator Ch. 07 - Input
14	IN-07+	Opto-isolator Ch. 07 + Input
15	IN-08-	Opto-isolator Ch. 08 - Input

16	IN-08+	Opto-isolator Ch. 08 + Input
17	IN-09-	Opto-isolator Ch. 09 - Input
18	IN-09+	Opto-isolator Ch. 09 + Input
19	IN-10-	Opto-isolator Ch. 10 - Input
20	IN-10+	Opto-isolator Ch. 10 + Input
21	IN-11-	Opto-isolator Ch. 11 - Input
22	IN-11+	Opto-isolator Ch. 11 + Input
23	IN-12-	Opto-isolator Ch. 12 - Input
24	IN-12+	Opto-isolator Ch. 12 + Input
25	IN-13-	Opto-isolator Ch. 13 - Input
26	IN-13+	Opto-isolator Ch. 13 + Input
27	IN-14-	Opto-isolator Ch. 14 - Input
28	IN-14+	Opto-isolator Ch. 14+ Input
29	IN-15-	Opto-isolator Ch. 15 - Input
30	IN-15+	Opto-isolator Ch. 15 + Input
31	IN-16-	Opto-isolator Ch. 16 - Input
32	IN-16+	Opto-isolator Ch. 16 + Input
33	GND	
34	GND	
35	DC + 5V	DC + 5V output
36	DC + 5V	DC + 5V output
37	DC + 12V	DC + 12V output
38	DC + 12V	DC + 12V output
39	GND	
40	GND	

APPENDIX A

WARRANTY INFORMATION

A.1 Copyright

Each piece of SmartLab package permits user to use SmartLab only on a single computer, a registered user may use he program on a different computer, but may not use the program on more than one computer at the same time.

Corporate licensing agreements allow duplication and distribution of specific number of copies within the licensed institution. Duplication of multiple copies is not allowed except through execution of a licensing agreement. Welcome call for details.

A.2 Warranty Information

SmartLab warrants that for a period of one year from the date of purchase (unless otherwise specified in the warranty card) that the goods supplied will perform according to the specifications defined in the user manual. Furthermore that the SmartLab product will be supplied free from defects in materials and workmanship and be fully functional under normal usage.

In the event of the failure of a SmartLab product within the specified warranty period, SmartLab will, at its option, replace or repair the item at no additional charge. This limited warranty does not cover damage resulting from incorrect use, electrical interference, accident, or modification of the product.

All goods returned for warranty repair must have the serial number intact. Goods without serial numbers attached will not be covered by the warranty.

The purchaser must pay transportation costs for goods returned. Repaired goods will be dispatched at the expense of SmartLab.

To ensure that your SmartLab product is covered by the warranty provisions, it is necessary that you return the Warranty card.

Under this Limited Warranty, SmartLab's obligations will be limited to repair or replacement only, of goods found to be defective a specified above during the warranty period. SmartLab is not liable to the purchaser for any damages or losses of any kind, through the use of, or inability to use, the SmartLab product.

SmartLab reserves the right to determine what constitutes warranty repair or replacement.

Return Authorization: It is necessary that any returned goods are clearly marked with an RA number that has been issued by SmartLab. Goods returned without this authorization will not be attended to.

APPENDIX B

DATA SHEET

TLP620, TLP620-2, TLP620-4

PROGRAMMABLE CONTROLLERS

AC / DC-INPUT MODULE

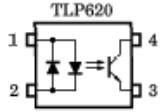
TELECOMMUNICATION

The TOSHIBA TLP620, -2 and -4 consists of a photo-transistor optically coupled to two gallium arsenide infrared emitting diode connected in inverse parallel.
The TLP620-2 offers two isolated channels in an eight lead plastic DIP, while the TLP620-4 provides four isolated channels in a sixteen plastic DIP.

- Collector-Emitter Voltage : 55V (Min.)
- Current Transfer Ratio : 50% (Min.)
  Rank GB : 100% (Min.)

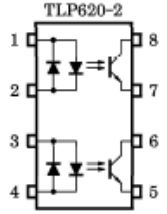
PIN CONFIGURATIONS (TOP VIEW)

TLP620



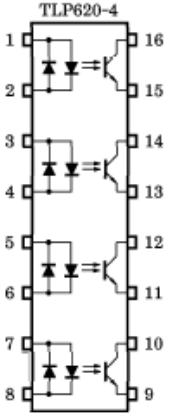
1 : ANODE
CATHODE
2 : CATHODE
ANODE
3 : EMITTER
4 : COLLECTOR

TLP620-2



1, 3 : ANODE
CATHODE
2, 4 : CATHODE
ANODE
5, 7 : EMITTER
6, 8 : COLLECTOR

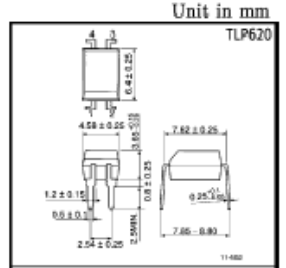
TLP620-4



1, 3, 5, 7 : ANODE, CATHODE
2, 4, 6, 8 : CATHODE, ANODE
9, 11, 13, 15 : EMITTER
10, 12, 14, 16 : COLLECTOR

Unit in mm

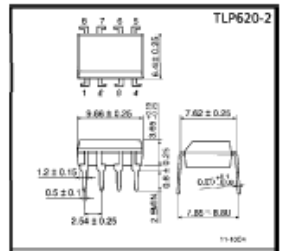
TLP620



TOSHIBA 11-5B2

Weight : 0.26g

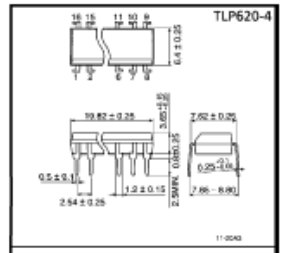
TLP620-2



TOSHIBA 11-10C4

Weight : 0.54g

TLP620-4



TOSHIBA 11-20A3

Weight : 1.1g

	MADE IN JAPAN		MADE IN THAILAND	
UL Recognized	E67349	*1	E152349	*1
BSI Approved	7426, 7427	*2	7426, 7427	*2

*1 UL1577
*2 BS EN60065 : 1994, BS EN60950 : 1992

- Isolation Voltage : 5000V_{rms} (Min.)
- Option (D4) type
  VDE Approved : DIN VDE0884 / 06.92, Certificate No. 68384
  Maximum Operating Insulation Voltage : 890V_{PK}
  Highest Permissible Over Voltage : 8000V_{PK}

(Note) When a VDE0884 approved type is needed, please designate the "Option (D4)".

- Creepage Distance : 6.4mm (Min.)
  Clearance : 6.4mm (Min.)
  Insulation Thickness : 0.4mm (Min.)

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING		UNIT
			TLP620	TLP620-2 TLP620-4	
LED	Forward Current	I_F (RMS)	60	50	mA
	Forward Current Derating	ΔI_F / °C	−0.7 (Ta ≧ 39°C)	−0.5 (Ta ≧ 25°C)	mA / °C
	Pulse Forward Current	I_{FP}	1 (100μs pulse, 100pps)		A
	Power Dissipation (1 Circuit)	P_D	100	70	mW
	Power Dissipation Derating	ΔP_D / °C	−1.0	−0.7	mW / °C
	Junction Temperature	T_j	125		°C
DETECTOR	Collector-Emitter Voltage	V_{CEO}	55		V
	Emitter-Collector Voltage	V_{ECO}	7		V
	Collector Current	I_C	50		mA
	Collector Power Dissipation (1 Circuit)	P_C	150	100	mW
	Collector Power Dissipation Derating (1 Circuit) (Ta ≧ 25°C)	ΔP_C / °C	−1.5	−1.0	mW / °C
	Junction Temperature	T_j	125		°C
Storage Temperature Range		T_{stg}	−55~125		°C
Operating Temperature Range		T_{opr}	−55~100		°C
Lead Soldering Temperature		T_{sold}	260 (10s)		°C
Total Package Power Dissipation		P_T	250	150	mW
Total Package Power Dissipation Derating (Ta ≧ 25°C, 1 Circuit)		ΔP_T / °C	−2.5	−1.5	mW / °C
Isolation Voltage		BV_S	5000 (AC, 1 min., RH ≦ 60%)		V_{rms}

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	—	5	24	V
Forward Current	I_F (RMS)	—	16	20	mA
Collector Current	IC	—	1	10	mA
Operating Temperature	T_{opr}	−25	—	85	°C

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	I_F = ±10mA	1.0	1.15	1.3	V
	Forward Current	I_F	V_F = ±0.7V	—	2.5	20	μA
	Capacitance	C_T	V = 0, f = 1MHz	—	60	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 0.5mA	55	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_E = 0.1mA	7	—	—	V
	Collector Dark Current	I_{CEO}	V_{CE} = 24V	—	10	100	nA
			V_{CE} = 24V, Ta = 85°C	—	2	50	μA
	Capacitance (Collector to Emitter)	C_{CE}	V_{CE} = 0, f = 1MHz	—	10	—	pF

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	I_F = ±5mA, V_{CE} = 5V	50	—	600	%
		Rank GB	100	—	600	
Saturated CTR	I_C / I_F (sat)	I_F = ±1mA, V_{CE} = 0.4V	—	60	—	%
		Rank GB	30	—	—	
Collector-Emitter Saturation Voltage	V_{CE} (sat)	I_C = 2.4mA, I_F = ±8mA	—	—	0.4	V
		I_C = 0.2mA, I_F = ±1mA	—	0.2	—	
		Rank GB	—	—	0.4	
Off-State Collector Current	$I_{C(off)}$	V_F = ±0.7V, V_{CE} = 24V	—	1	10	μA
CTR Symmetry	$I_{C(ratio)}$	I_C (I_F = −5mA) / I_C (I_F = +5mA)	0.33	1	3	—

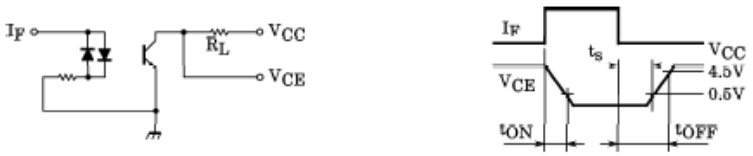
ISOLATION CHARACTERISTICS (Ta = 25°C)

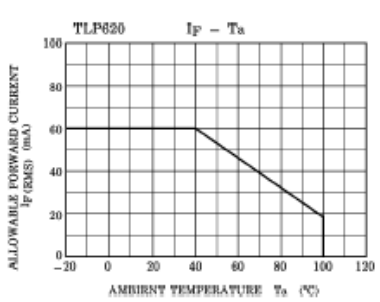
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance Input to Output	C_S	V_S=0, f=1MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S=500V	1×10^{12}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	5000	—	—	V_{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V_{dc}

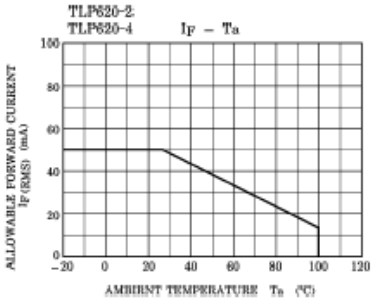
SWITCHING CHARACTERISTICS (Ta = 25°C)

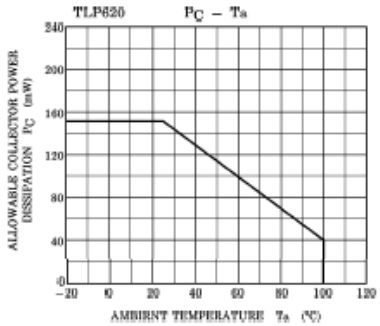
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	V_{CC}=10V, I_C=2mA, R_L=100Ω	—	2	—	μs
Fall Time	t_f		—	3	—	
Turn-on Time	t_{on}		—	3	—	
Turn-off Time	t_{off}		—	3	—	
Turn-on Time	t_{ON}	R_L=1.9kΩ (Fig.1) V_{CC}=5V, I_F=±16mA	—	2	—	μs
Storage Time	t_s		—	15	—	
Turn-off Time	t_{OFF}		—	25	—	

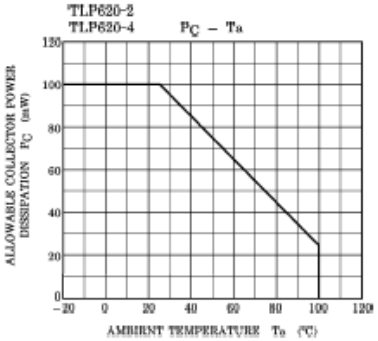
Fig.1 Switching Time Test Circuit

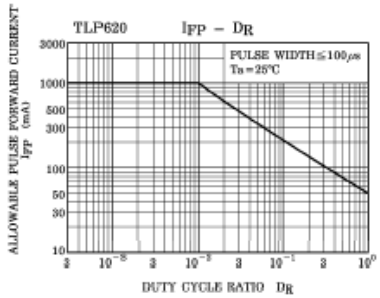


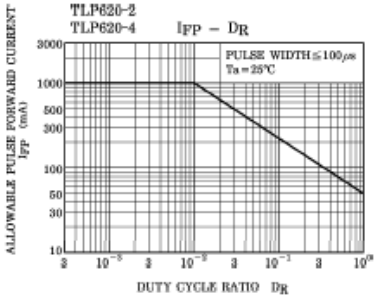


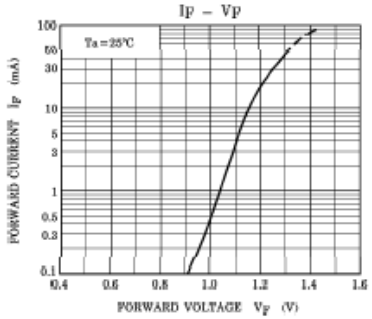


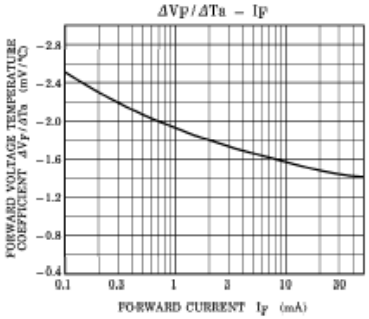


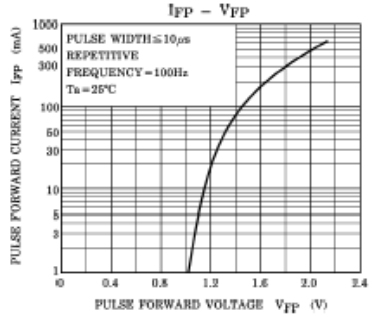


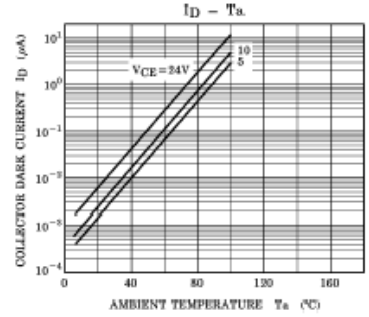


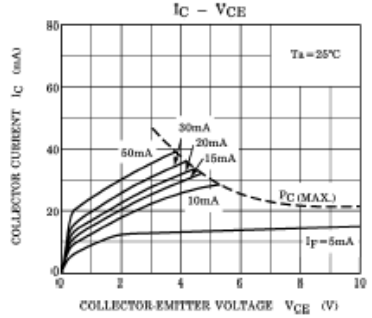


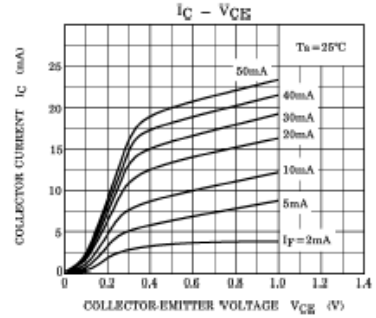

IF – VF
Ta=25°C
FORWARD CURRENT IF (mA)
FORWARD VOLTAGE VF (V)

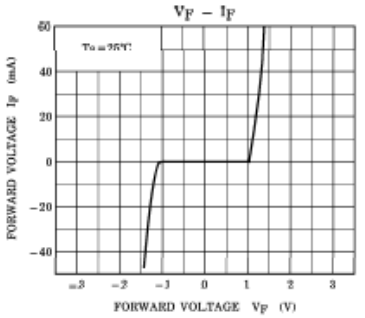

ΔVF/ΔTa – IF
FORWARD VOLTAGE TEMPERATURE COEFFICIENT ΔVF/ΔTa (mV/°C)
FORWARD CURRENT IF (mA)

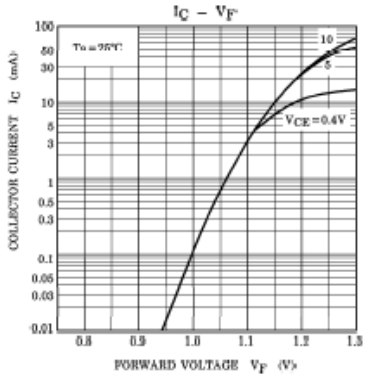

IFP – VFP
PULSE WIDTH≤10μs
REPETITIVE
FREQUENCY=100Hz
Ta=25°C
PULSE FORWARD CURRENT IFP (mA)
PULSE FORWARD VOLTAGE VFP (V)

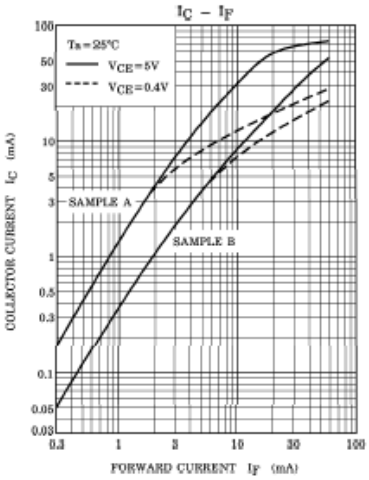

ID – Ta.
VCE=24V
10
5
COLLECTOR DARK CURRENT ID (μA)
AMBIENT TEMPERATURE Ta (°C)

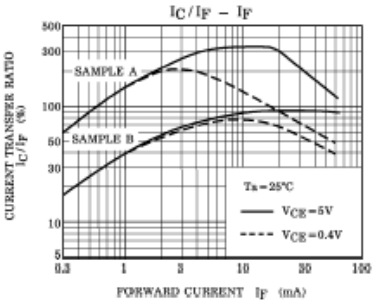

IC – VCE
Ta=25°C
50mA
30mA
20mA
15mA
10mA
PC (MAX.)
IF=5mA
COLLECTOR CURRENT IC (mA)
COLLECTOR-EMITTER VOLTAGE VCE (V)

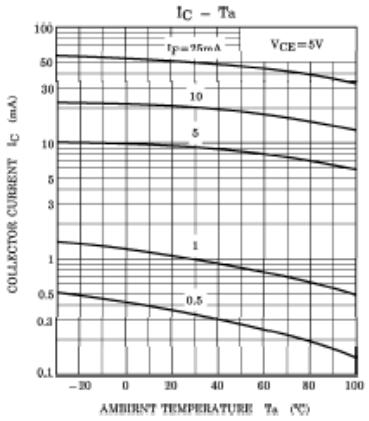

IC – VCE
Ta=25°C
50mA
40mA
30mA
20mA
10mA
5mA
IF=2mA
COLLECTOR CURRENT IC (mA)
COLLECTOR-EMITTER VOLTAGE VCE (V)

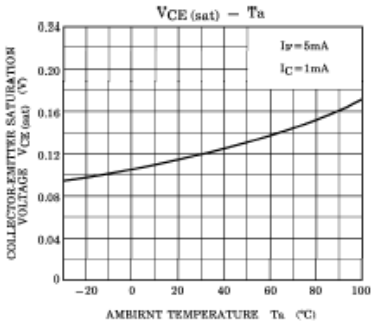

VF – IF
Ta=25°C
FORWARD VOLTAGE IF (mA)
FORWARD VOLTAGE VF (V)

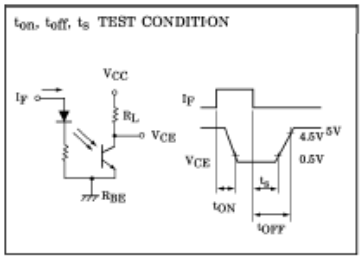

IC – VF
Ta=25°C
10
5
VCE=0.4V
COLLECTOR CURRENT IC (mA)
FORWARD VOLTAGE VF (V)

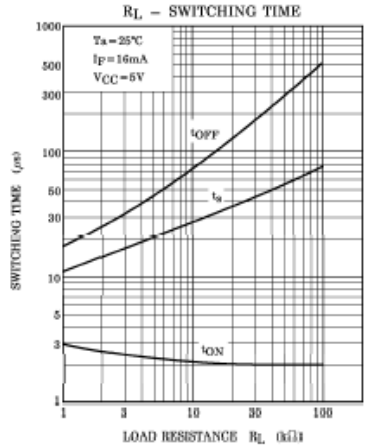

IC – IF
Ta=25°C
VCE=5V
VCE=0.4V
SAMPLE A
SAMPLE B
COLLECTOR CURRENT IC (mA)
FORWARD CURRENT IF (mA)


IC/IF – IF
SAMPLE A
SAMPLE B
Ta=25°C
VCE=5V
VCE=0.4V
CURRENT TRANSFER RATIO IC/IF (%)
FORWARD CURRENT IF (mA)









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000707EBC

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- The products described in this document are subject to the foreign exchange and foreign trade laws.
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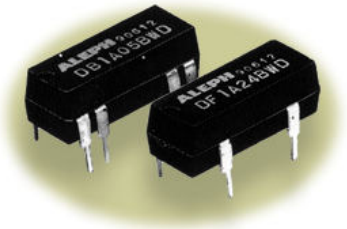
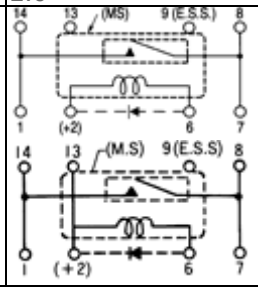
4 PIN DIP/DF Series

UL models available

- Industry standard package
- Transfer molded for environmental protection
- Miniature size
- Compatible with DIP handling, sorting and PCB insertion quipment
- Optional shielding and diodes



Coil Ratings

Part Number	DB1A**BW(D) DA1A**BW(D)
Nominal Voltage (VDC)	5 12 24
Coil Resistance (ohms) ±10%	500 850 2200
Operate Voltage (VDC) max.	3.8 9.0 18.0
Release Voltage (VDC) min.	0.5 1.0 2.0
Schematics	

Contact Ratings

Parameters		DA1A**BW DA2A**BW DA1B**BW	DB1A**BW DB2A**BW DB1B**BW	DA1C**BW DB1C**BW	DA1A**NW DA1A**DW Mercury	DF1A**BW DF1B**BW
Power (W) max.		10		3	50	10
Voltage (VDC) max.		200		100	500	200
Switching Current (A) max.		0.5		0.25	2.0	0.5
Carry Current (A) max.		1.0		0.5	2.0	1.0
Contact Resistance (ohms) max. (initial)		0.15		0.15	0.1	0.15 (1A) 0.2 (1B)
Breakdown Voltage (VDC) min.	Open Contact	250		200	1000	250
	Contact to Coil	1500		1500	1500	1500
Insulation Resistance (ohms) min.	Open Contact	10^{10}		10^{8}	10^{10}	10^{10}
	Contact to Coil	10^{10}		10^{10}	10^{10}	10^{10}
Operate Time (mS) max (incl. bounce)		1.0		2.0	1.0 (NW) 2.0 (DW)	1.0
Release Time (mS) max.		0.5		2.5	1.0 (NW) 2.0 (DW)	0.5
Electrical Life	Low Level	10^{8} (10mVDC, 10µA)		5 X 10^{8} (10VDC, 4mA)	10^{9} (10VDC, 4mA)	10^{8} (10mVDC, 10µA)
	Rated Load	6 X 10^{5} (20VDC, 0.5A)		2 X 10^{6} (12VDC, 0.25A)	10^{6} (50VDC, 1.0A)	6 X 10^{5} (20VDC, 0.5A)

Dimensions

DA - DB Series	DF Series