

4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

General Description

- The DPC-817 series are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor
- The lead pitch is 2.54mm

Rank Table Of Current Transfer Ratio (CTR)

RANK MARK.	Min. (%)	Max. (%)
L	50	100
A	80	160
B	130	260
C	200	400
D	300	600
L or A or B or C or D	50	600

Notes: Conditions: $I_F=5mA$, $V_{CE}=5V$, $T_a=25^{\circ}C$.

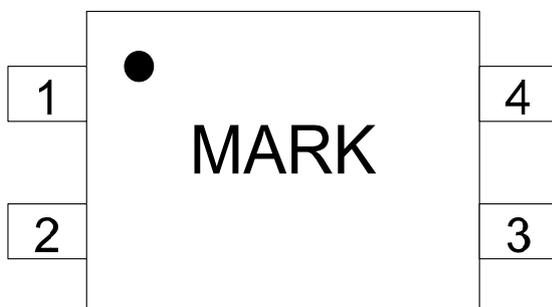
Features

- Current transfer ratio (CTR: 50~600% at $I_F=5mA$, $V_{CE}=5V$)
- High isolation voltage between input and output ($V_{iso}=5000 V_{rms}$)
- Creepage distance >7.62 mm
- Operating temperature up to $+110^{\circ}C$
- Compact small outline package
- Pb free and RoHS compliant.
- UL approved (No.E343249)

Applications

- Computer terminals.
- System appliances, measuring instruments.
- Registers, copiers, automatic vending machines.
- Electric home appliances, such as fan heaters, etc, of different potentials and impedances.
- Signal transmission between circuits

Pin Configuration



Pin Assignment

Pin num.	Symbol	Functions
1	Anode	Input
2	Cathode	
3	Emitter	Output
4	Collector	

Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Rating	Unit
INPUT	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
OUTPUT	Collector-Emitter Voltage	V_{CEO}	35	V
	Emitter- Collector Voltage	V_{ECO}	6	
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
Total Power Dissipation		P_{tot}	200	mW
Isolation Voltage(NOTE)		V_{ISO}	5000	Vrms
Rated impulse isolation voltage		V_{IOTM}	6000	V
Rated repetitive peak isolation voltage		V_{IORM}	630	V
operating Junction Temperature T_J		T_{OPR}	-40 to 85	°C
Storage Temperature		T_{STQ}	-55 to 125	
Lead Temperature (Soldering, 10secs)		T_{SOL}	260	

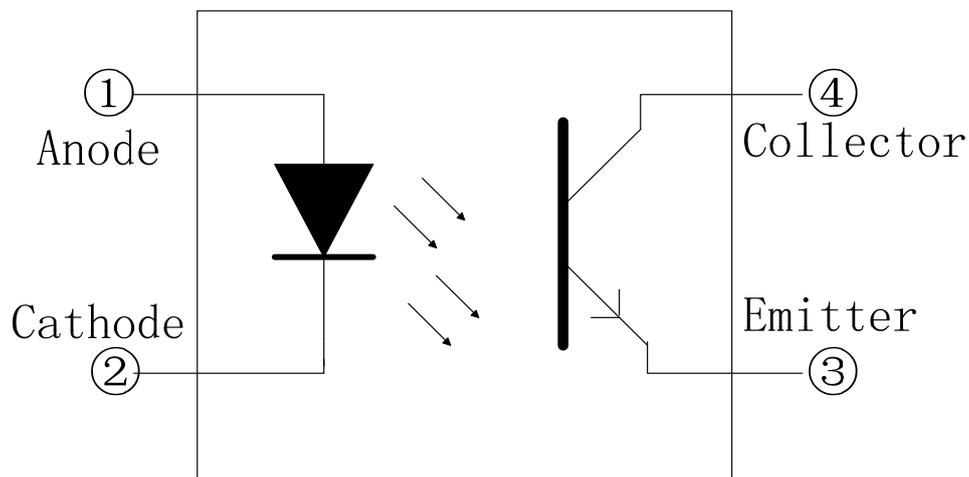
Notes: AC For minute, R.H. =40~60%

Isolation voltage shall be measured using the following method.

- (1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.
- (2) The isolation voltage tester with zero-cross circuit shall be used.
- (3) The waveform of applied voltage shall be a sine wave.

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

Block Diagram



Electrical Characteristics

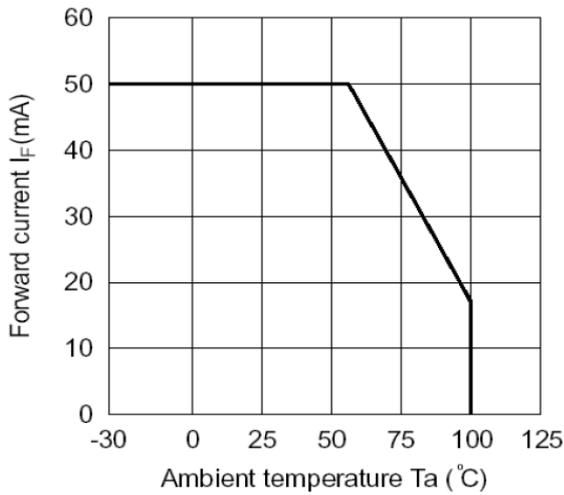
 (T_A =25 °C, unless otherwise noted.)

Item	Symbol	Test condition	Min	Typ	Max	Unit
Input Section						
Forward Voltage	V _F	I _F =20mA		1.2	1.4	V
Reverse Current	I _R	V _R =4V			10	uA
Terminal Capacitance	C _t	V=0, f=1KHz		30	250	PF
Output Section						
Collector Dark Current	I _{CEO}	V _{CE} =20V, I _F =0			100	nA
Collector-Emitter Breakdown Voltage	BV _{CEO}	I _C =0.1mA I _F =0	35			V
Emitter-Collector Breakdown Voltage	BV _{ECO}	I _E =10μA I _F =0	6			V
Transfer Characteristic Section						
Collector Current	I _C	I _F =5mA V _{CE} =5V	2.5		30	mA
Current Transfer Ratio(note)	CTR		50		600	%
Collector-Emitter Saturation Voltage	V _{CE(sat)}	I _F =20mA I _C = 1mA		0.1	0.2	V
Isolation Resistance	R _{iso}	DC500V 40~60%R.H.	5×10 ¹⁰	1×10 ¹¹		
Floating Capacitance	C _f	V=0, f=1MHz		0.6	1	pF
Cut-Off Frequency	f _c	V _{CE} =5V, I _C =2mA R _L =100Ω, -3dB		80		kHz
Response Time(Rise)	t _r	V _{CE} =2V, I _C =2mA R _L =100Ω		4	18	uS
Response Time(Fall)	t _f			3	18	uS

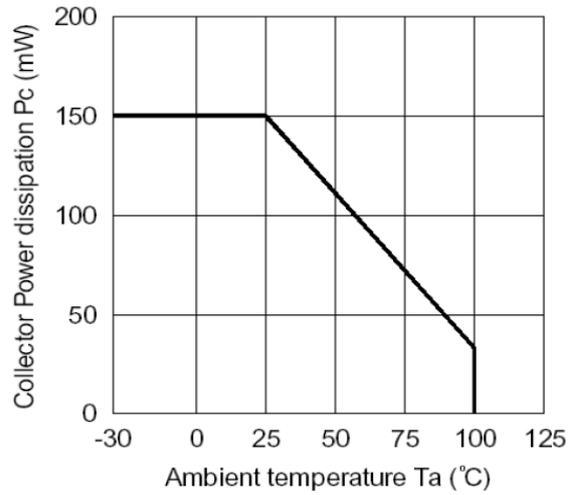
Note: CTR= I_C / I_F × 100%

Typical performance characteristics

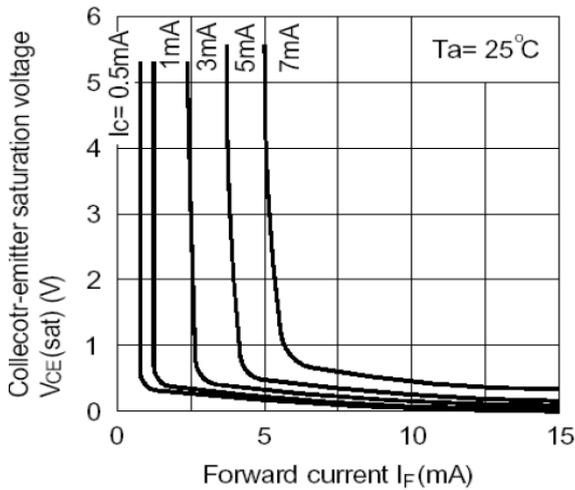
(1) Forward Current vs. Ambient Temperature



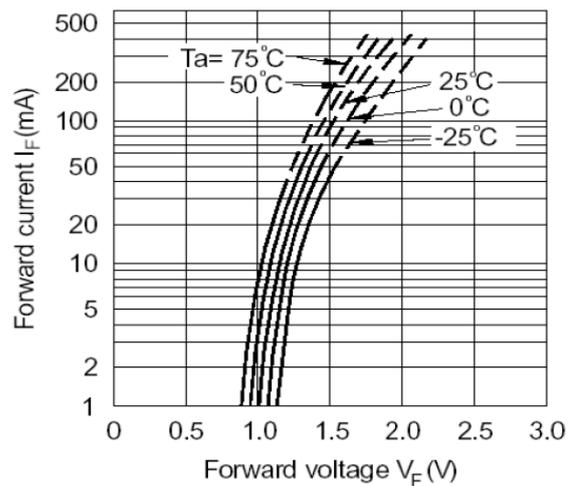
(2) Collector Power Dissipation vs. Ambient Temperature



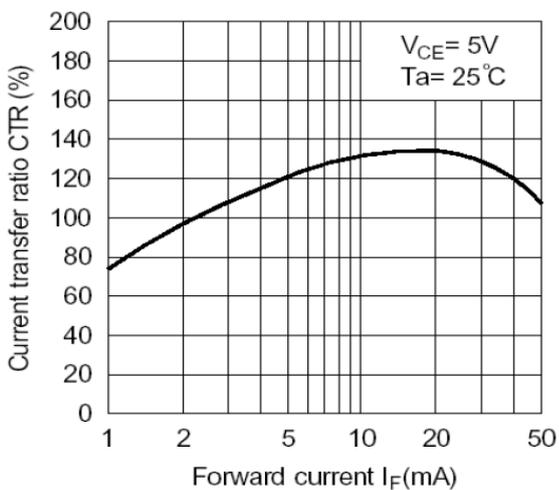
(3) Collector-emitter Saturation Voltage vs. Forward Current



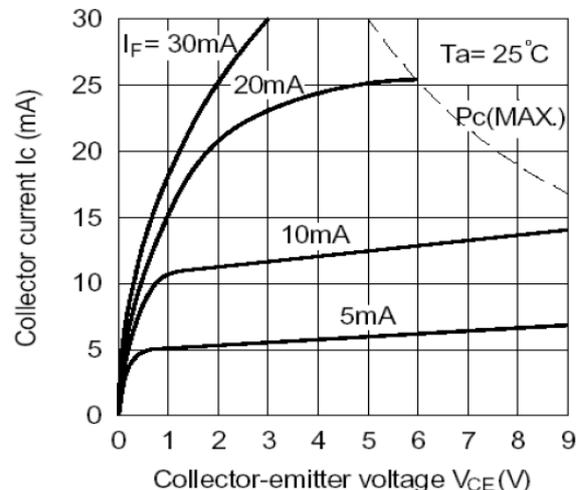
(4) Forward Current vs. Forward Voltage



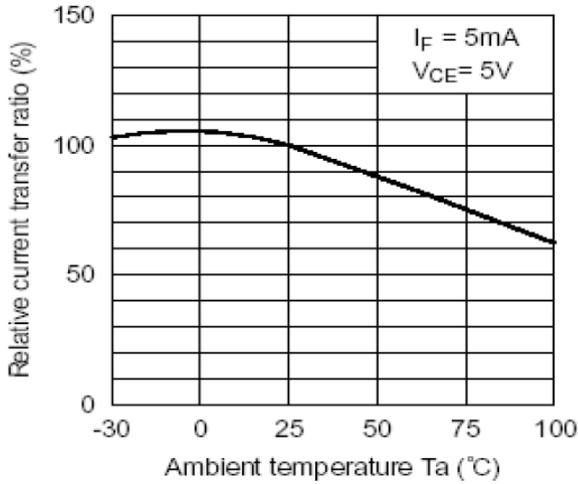
(5) Current Transfer Ratio vs. Forward Current



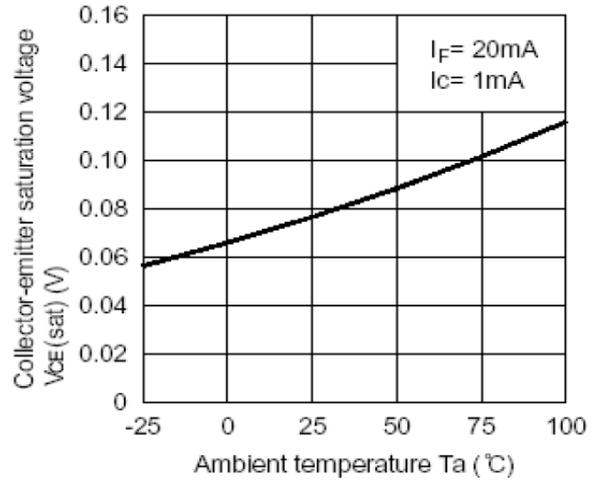
(6) Collector Current vs. Collector-emitter Voltage



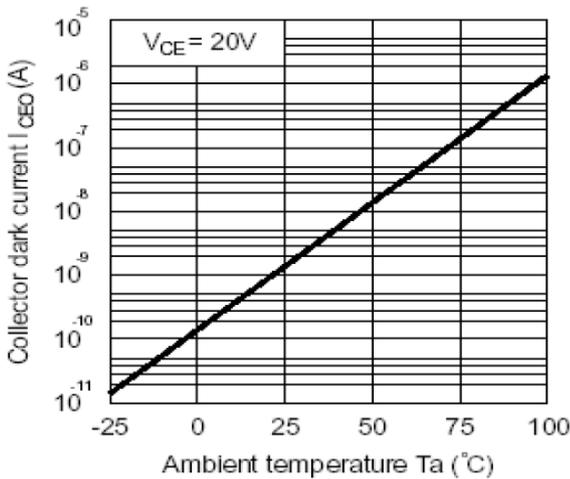
(7) Relative Current Transfer Ratio vs. Ambient Temperature



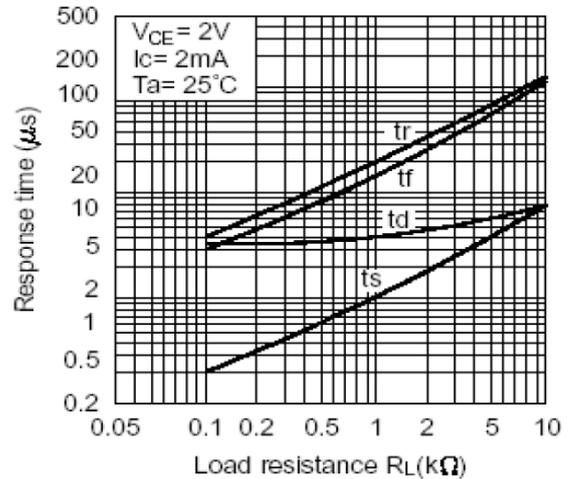
(8) Collector-emitter Saturation Voltage vs. Ambient Temperature



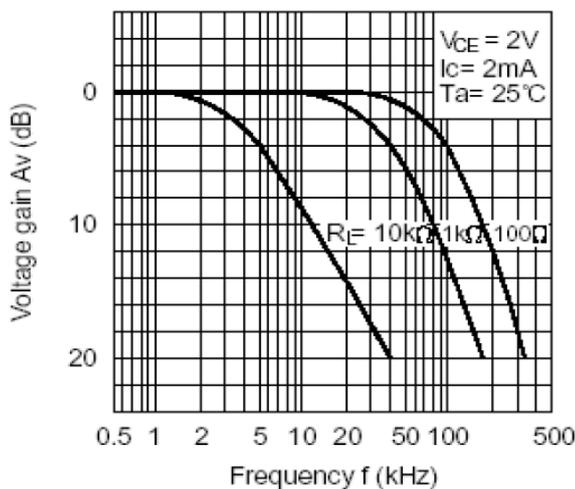
(9) Collector Dark Current vs. Ambient Temperature



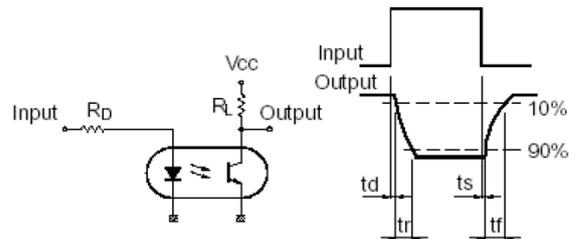
(10) Response Time vs. Load Resistance



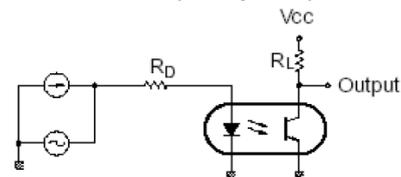
(11) Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



Reliability Test

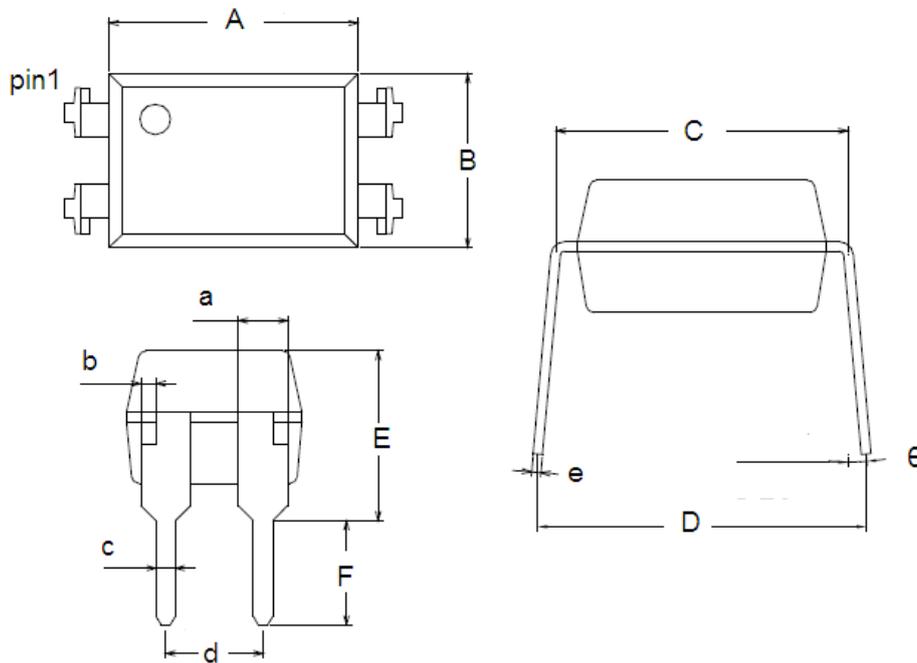
Classification	Test Item	Reference Standard	Test Conditions	Result
Endurance Test	Operation Life	MIL-STD-750:1026 MIL-STD-883:1005 JIS C 7021 : B-1	Connect with a power $I_f=50\text{mA}$ T_a =Under room temperature Test time=1,000hrs	0/20
	High Temperature High Humidity Reverse Bias (H3TRB)	JIS C 7021 :B-11	$T_a=+85^\circ\text{C}\pm 5^\circ\text{C}$, RH=85% PTR= V_{CE} Absolute max rating*80% Test time=1000hrs	0/20
	High Temperature Reverse Bias (HTRB)	JIS C 7021 : B- 8	$T_a=+105^\circ\text{C}\pm 5^\circ\text{C}$ PTR= V_{CE} absolute max rating Test time=1000hrs	0/20
	High Temperature Storage	MIL-STD-883:1008 JIS C 7021 :B-10	High $T_a=+125^\circ\text{C}\pm 5^\circ\text{C}$ Test time=1,000hrs	0/20
	Low Temperature Storage	JIS-C-7021 :B-12	Low $T_a=-55^\circ\text{C}\pm 5^\circ\text{C}$ Test time=1,000hrs	0/20
	Autoclave	JESD 22-A102-B	P=15PSIG, $T_a=121^\circ\text{C}$ Humi. =100%RH, 48hrs	0/20
Environmental Test	Temperature Cycling	MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1010 JIS C 7021 :A-4	$125^\circ\text{C} \sim 25^\circ\text{C} \sim -55^\circ\text{C} \sim 25^\circ\text{C}$ 30min 5min 30min 5min Test Time=20cycle	0/20
	Thermal Shock	MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1011	$125^\circ\text{C} \sim -55^\circ\text{C}$ 20min 20min Test Time=20cycle	0/20
	Solder Resistance	MIL-STD-202:201A MIL-STD-750:2031 JIS C 7021 :A-1	Operation heating : 300°C , within 10 ± 1 seconds.	0/20
	Solder Ability	MIL-S-883:2003 JIS C 7021 :A-2	Operation heating : 260°C , within 5 ± 1 seconds.	0/20

Judgment Criteria Of Failure For The Reliability

Symbol	Measuring conditions	Judgment criteria for failure
V_F (V)	$I_f=20\text{mA}$	Over $U_x1.0$
I_r (μA)	$V_r=4\text{V}$	Over $U_x1.0$
CTR(%)	$I_f=5\text{mA}$, $V_{CE}=5\text{V}$	Shift>1.2
$V_{CE}(\text{sat})$	$I_F=20\text{mA}$, $I_C=1\text{mA}$	Over $U_x1.0$
BV_{CEO}	$I_C=0.1\text{mA}$, $I_F=0$	Over $U_x1.0$
BV_{ECO}	$I_E=10\mu\text{A}$, $I_F=0$	Over $U_x1.0$

Package Information

Package type:DIP4 Unit:mm(inch)



Character	Dimension (mm)		Dimension (Inches)	
	Min	Max	Min	Max
A	6.200	6.600	0.244	0.260
B	4.280	4.880	0.169	0.192
C	7.620(Typ.)		0.300(Typ.)	
D	7.620	9.500	0.300	0.374
E	4.200	4.800	0.165	0.189
F	2.300	3.300	0.090	0.130
a	1.2	1.4	0.047	0.055
b	0.3	0.5	0.012	0.020
c	0.4	0.6	0.016	0.024
d	2.54(Typ.)		0.060(Typ.)	
e	0.25(Typ.)		(Typ.)	
θ	0°	15°	0°	15°

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