

## DIP4, AC Input, Photo Transistor Coupler

### Description

The FX814 series combine two AlGaAs infrared emitting diodes as the AC input which is optically coupled to a silicon planar phototransistor detector in a plastic DIP4 package with different lead forming options.

With the robust coplanar double mold structure, FX814 series provide the most stable isolation feature.

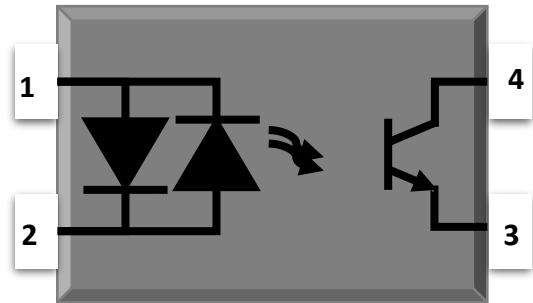
### Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- AC input with transistor output
- Operating temperature range - 55 °C to 110 °C
- REACH compliance
- Halogen free
- MSL class 1
- Regulatory Approvals
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC - GB4943.1, GB8898

### Applications

- AC line monitor
- Programmable controller
- Telephone line interface
- System appliance
- Measurement instrument

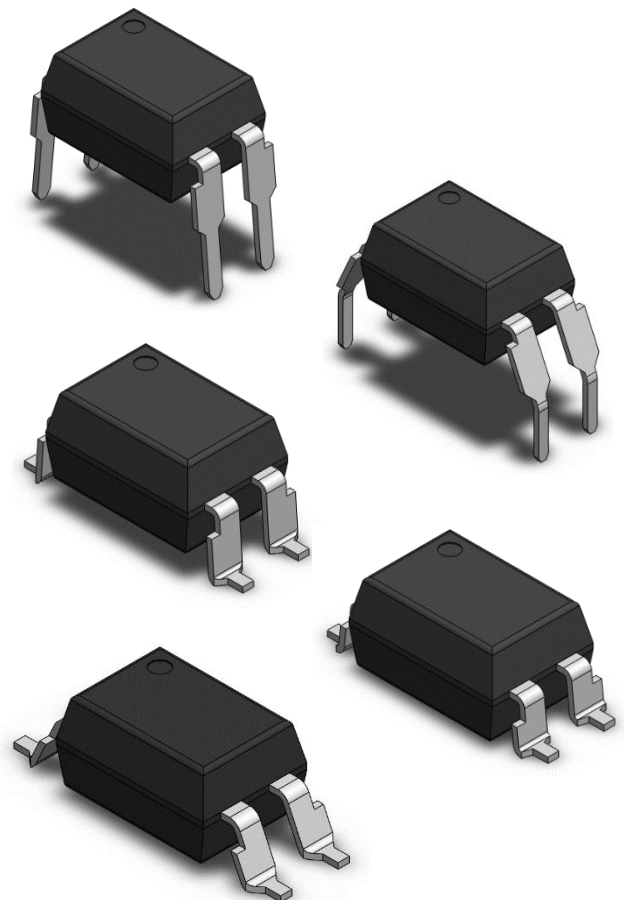
### SCHEMATIC



### PIN DEFINITION

1. Anode/Cathode
2. Cathode/Anode
3. Emitter
4. Collector

### PACKAGE OUTLINE





**DIP4, AC Input, Photo Transistor Coupler**

<b>ABSOLUTE MAXIMUM RATINGS</b>				
PARAMETER	SYMBOL	VALUE	UNIT	NOTE
<b>INPUT</b>				
Forward Current	I <sub>F</sub>	±60	mA	
Peak Forward Current	I <sub>FP</sub>	±1	A	1
Reverse Voltage	V <sub>R</sub>	6	V	
Input Power Dissipation	P <sub>I</sub>	100	mW	
<b>OUTPUT</b>				
Collector - Emitter Voltage	V <sub>CEO</sub>	80	V	
Emitter - Collector Voltage	V <sub>ECO</sub>	7	V	
Collector Current	I <sub>c</sub>	50	mA	
Output Power Dissipation	P <sub>O</sub>	150	mW	
<b>COMMON</b>				
Total Power Dissipation	P <sub>tot</sub>	200	mW	
Isolation Voltage	V <sub>iso</sub>	5000	V <sub>rms</sub>	2
Operating Temperature	T <sub>opr</sub>	-55~110	°C	
Storage Temperature	T <sub>stg</sub>	-55~125	°C	
Soldering Temperature	T <sub>sol</sub>	260	°C	

Note 1. 100µs pulse, 100Hz frequency

Note 2. AC For 1 Minute, R.H. = 40 ~ 60%

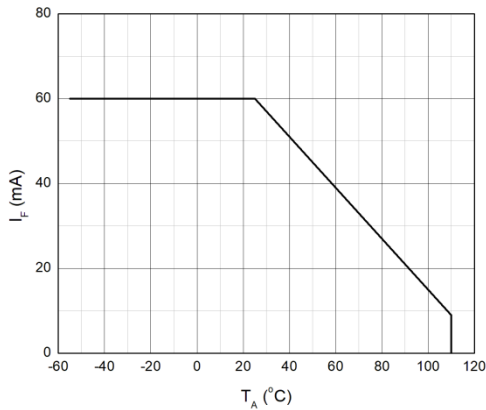
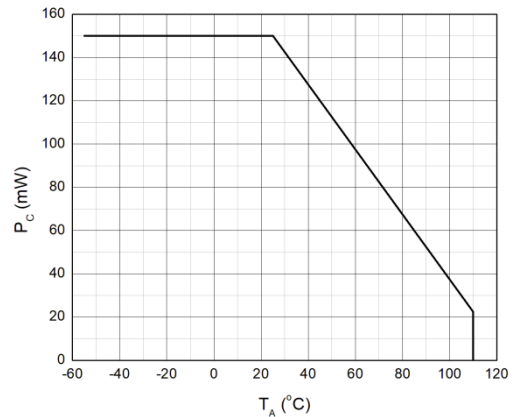
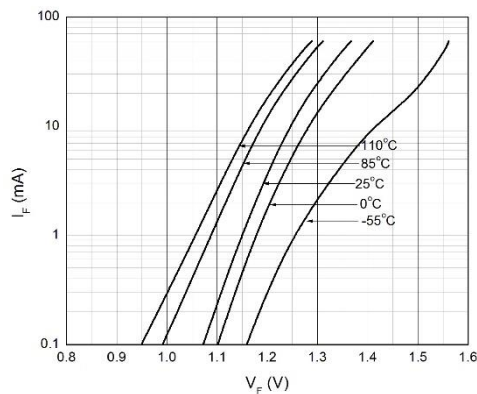
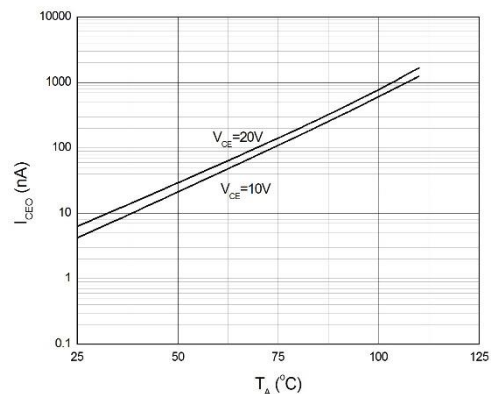
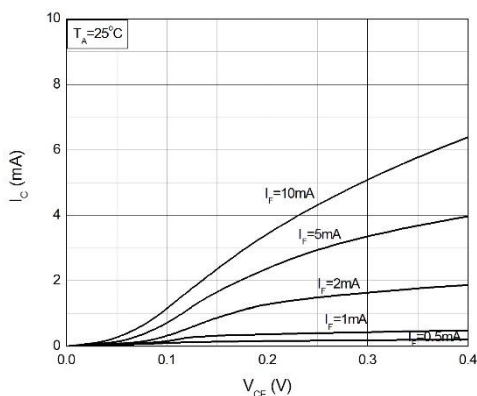
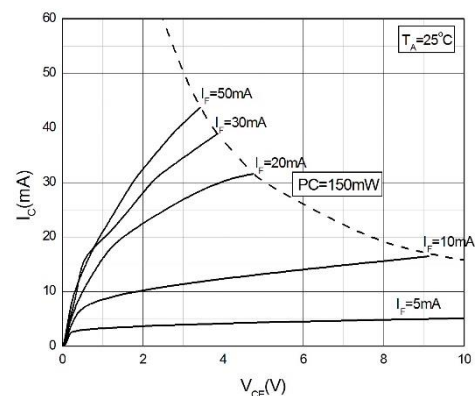


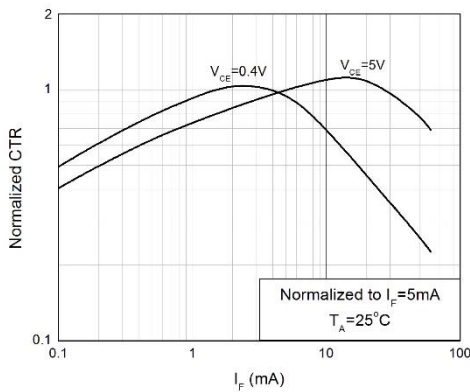
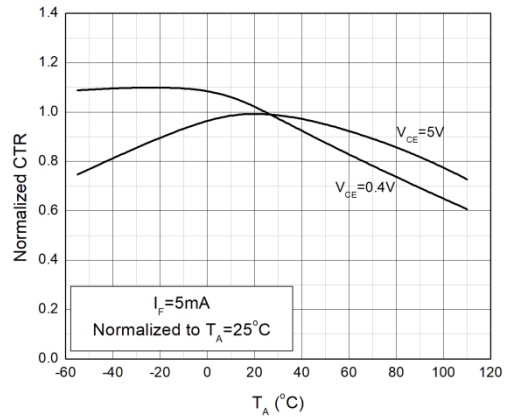
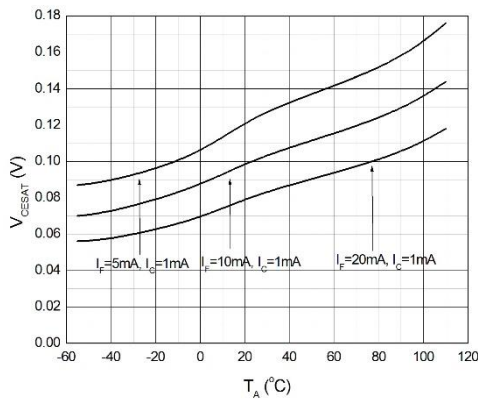
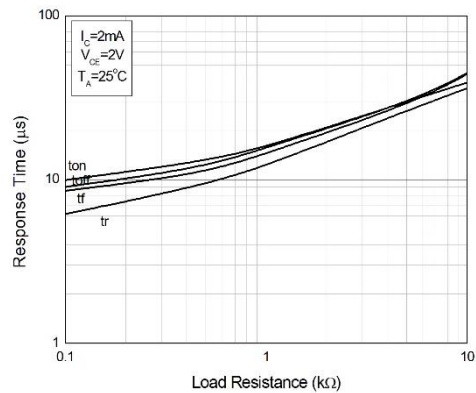
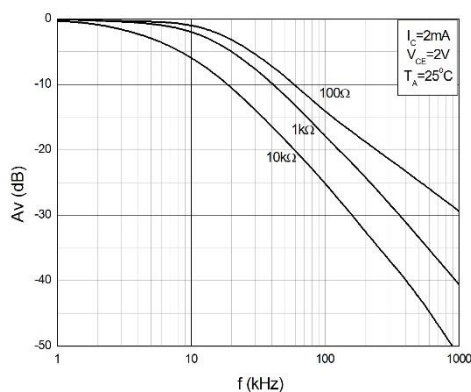
DIP4, AC Input, Photo Transistor Coupler

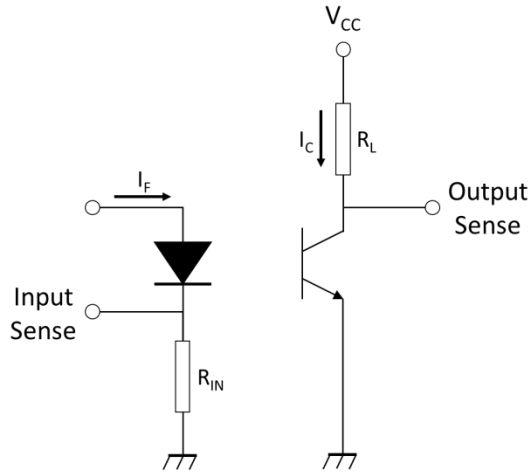
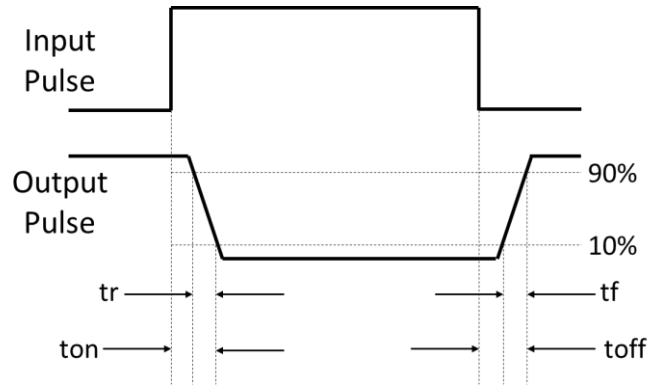
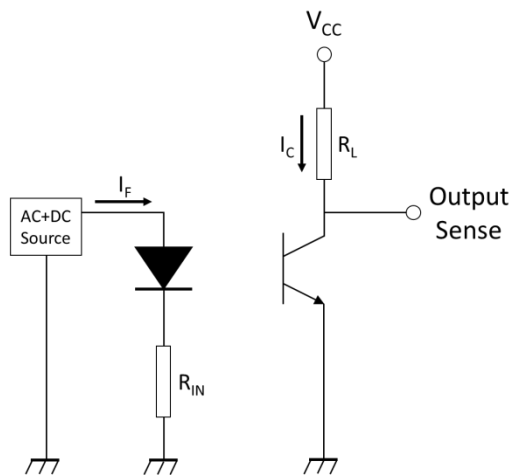
ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C							
PARAMETER	SYMBOL	MIN	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT							
Forward Voltage	V <sub>F</sub>	-	1.24	1.4	V	IF=±10mA	
Input Capacitance	C <sub>in</sub>	-	10	-	pF	V=0, f=1kHz	
OUTPUT							
Collector Dark Current	I <sub>CEO</sub>	-	-	100	nA	VCE=20V, IF=0	
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	80	-	-	V	IC=0.1mA, IF=0	
Emitter-Collector Breakdown Voltage	BV <sub>ECO</sub>	7	-	-	V	IE=0.1mA, IF=0	
TRANSFER CHARACTERISTICS							
Current Transfer Ratio	FX8140	CTR	20	-	400	%	IF=±1mA, VCE=5V
	FX814A		50	-	150		
	FX814B		80	-	400		
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	-	0.06	0.2	V	IF=±20mA, IC=1mA	
Isolation Resistance	R <sub>ISO</sub>	10 <sup>12</sup>	10 <sup>14</sup>	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C <sub>IO</sub>	-	0.4	1	pF	V=0, f=1MHz	
Response Time (Rise)	t <sub>r</sub>	-	3	18	μs	VCE=2V, IC=2mA RL=100Ω	3
Response Time (Fall)	t <sub>f</sub>	-	4	18	μs		3
Cut-off Frequency	f <sub>c</sub>	-	80	-	kHz	VCE=2V, IC=2mA RL=100Ω,-3dB	4

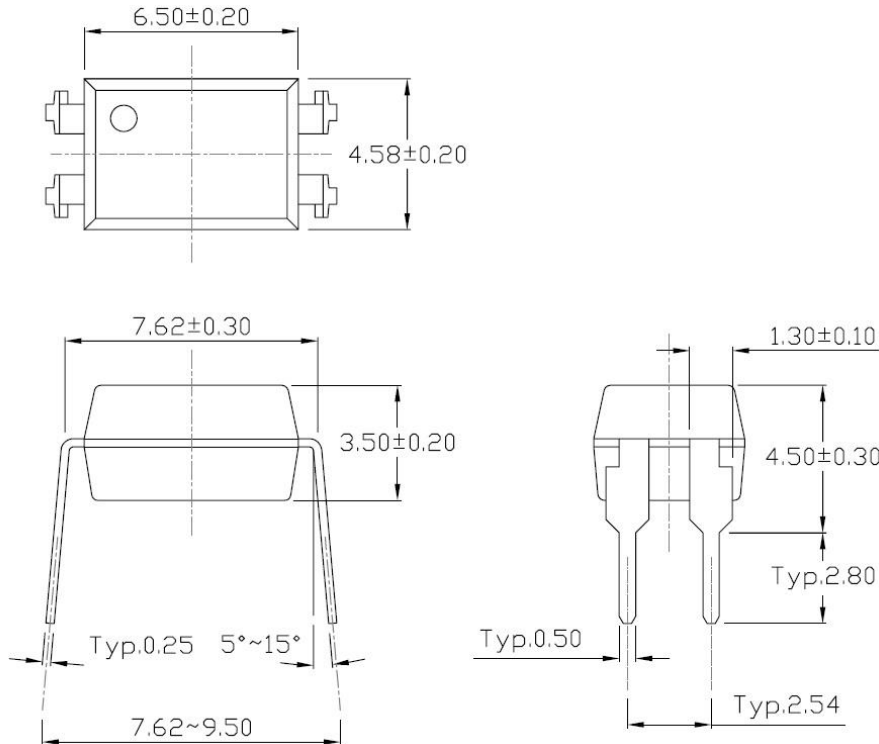
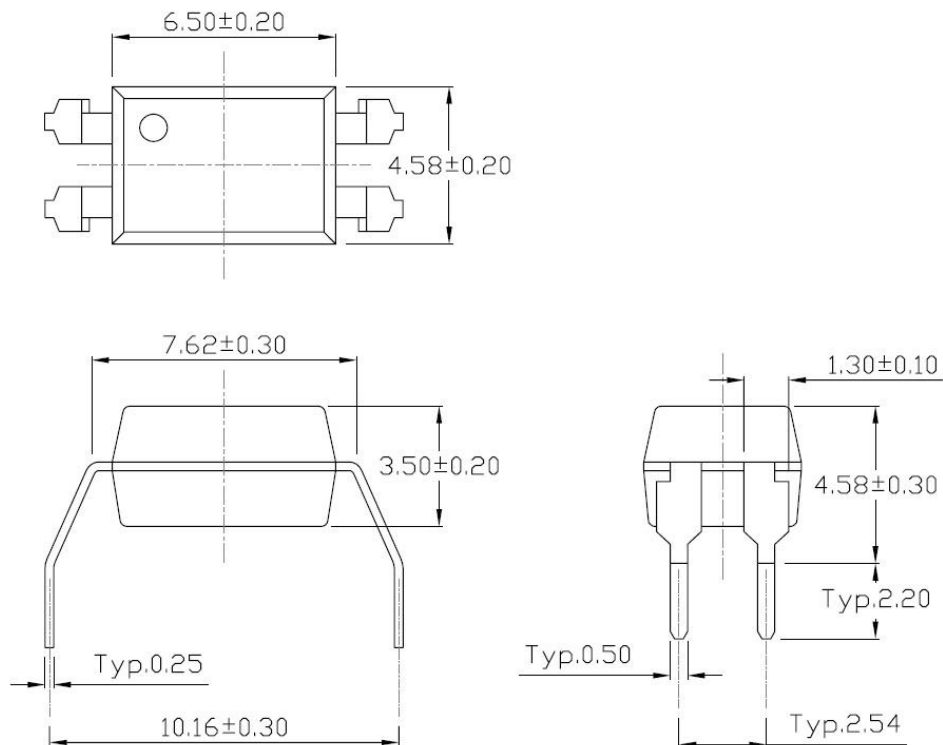
Note 3. Fig.12&13

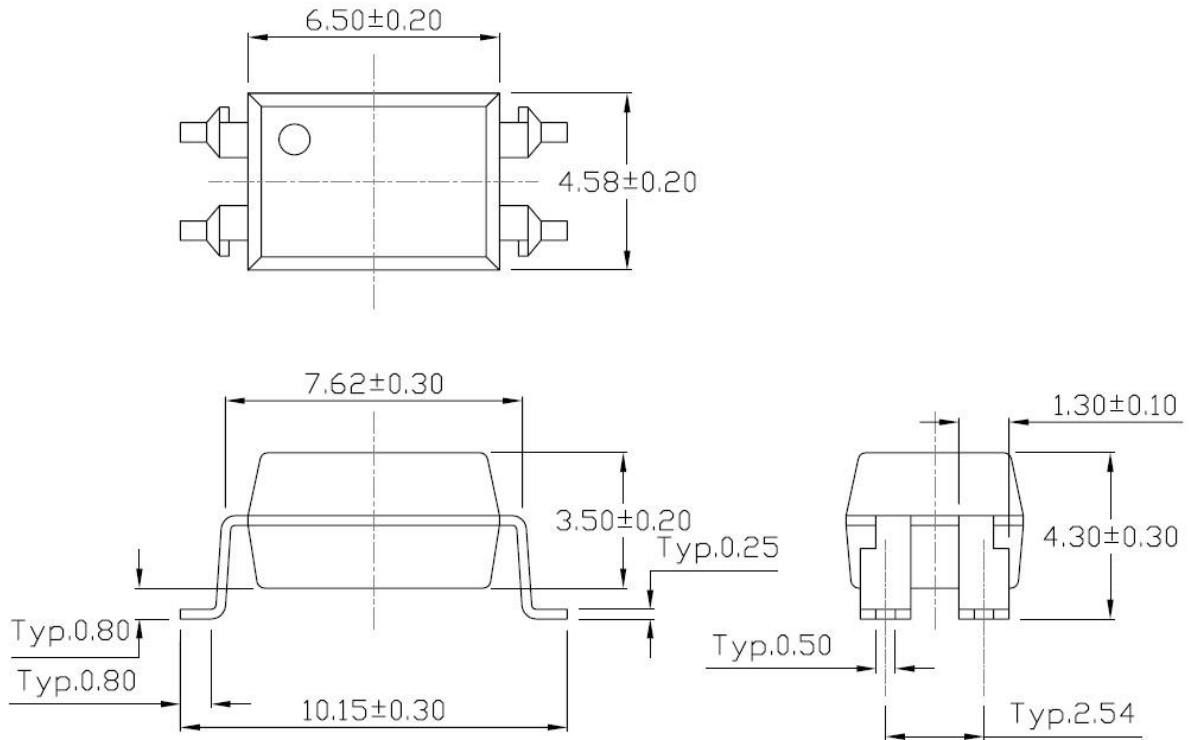
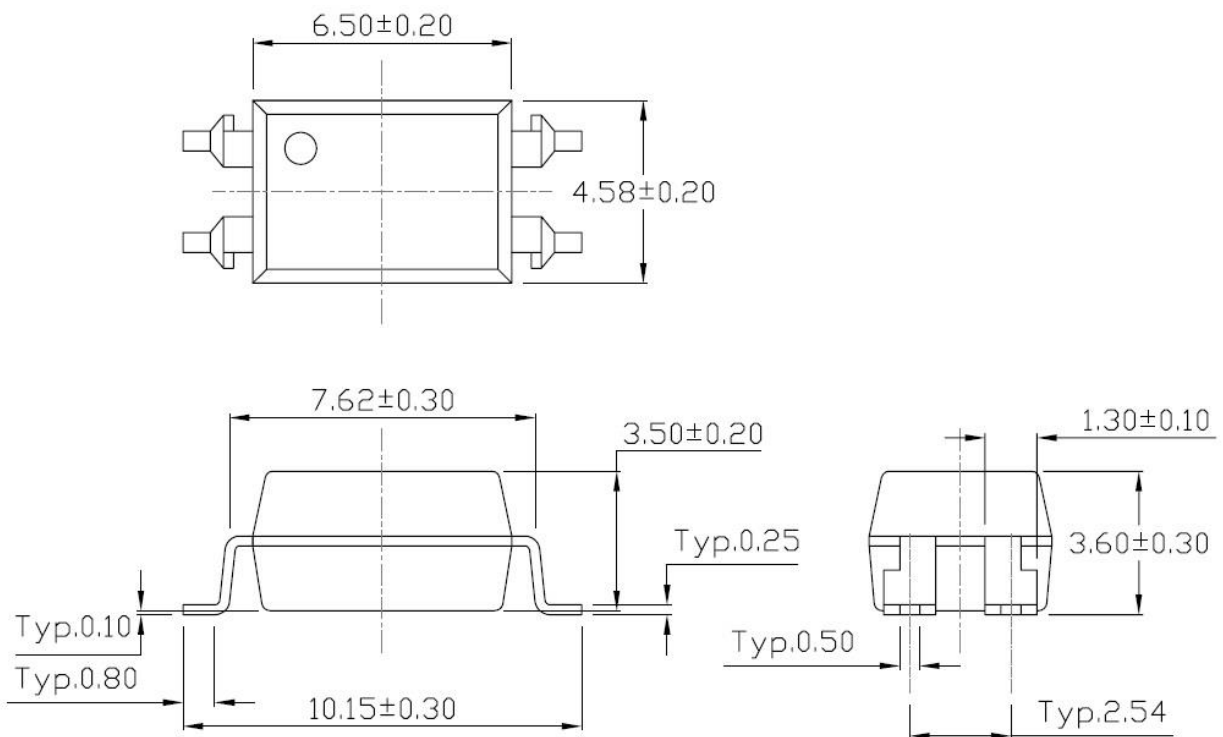
Note 4. Fig.14

**DIP4, AC Input, Photo Transistor Coupler**
**CHARACTERISTIC CURVES**
**Fig.1 Forward Current vs. Ambient Temperature**

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

**Fig.3 Forward Current vs. Forward Voltage**

**Fig.4 Collector Dark Current vs. Ambient Temperature**

**Fig.5 Collector Current vs. Collector-emitter Voltage**

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


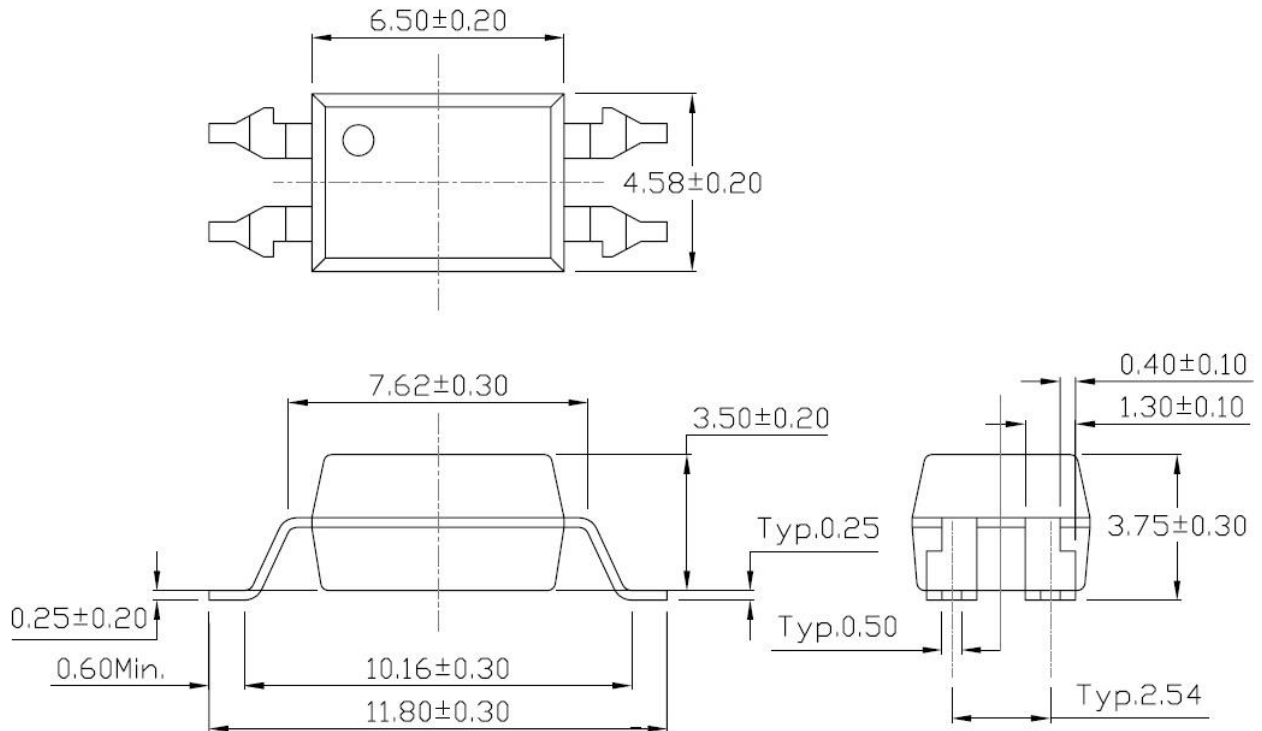
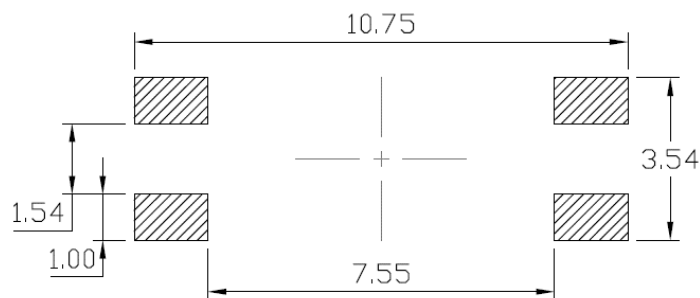
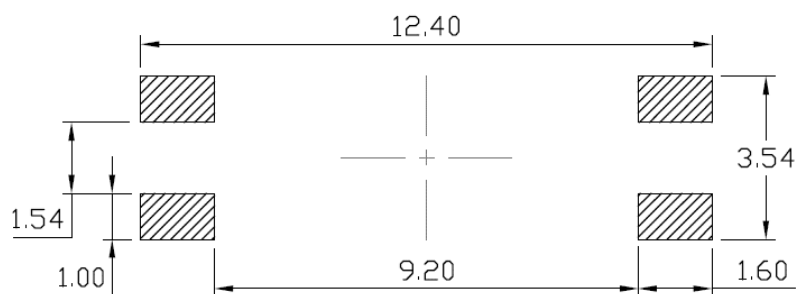
**DIP4, AC Input, Photo Transistor Coupler**
**CHARACTERISTIC CURVES**
**Fig.7 Normalized Current Transfer Ratio vs. Forward Current**

**Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature**

**Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature**

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

**Fig.11 Frequency Response**


**DIP4, AC Input, Photo Transistor Coupler**
**TEST CIRCUITS**
**Fig.12 Test Circuits of Response Time**

**Fig.13 Curves of Response Time**

**Fig.14 Test Circuits of Frequency Response**


**DIP4, AC Input, Photo Transistor Coupler**
**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**
**Standard DIP – Through Hole (N Type)**

**Gullwing (400mil) Lead Forming – Through Hole (M Type)**


**DIP4, AC Input, Photo Transistor Coupler**
**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**
**Surface Mount Lead Forming (S Type)**

**Surface Mount (Low Profile) Lead Forming (T Type)**




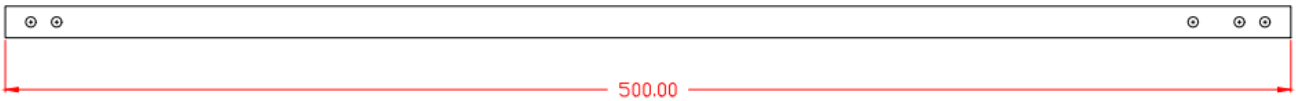
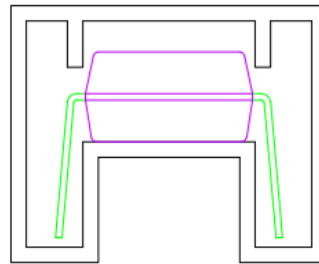
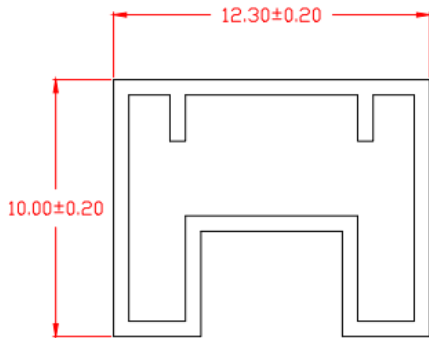
**DIP4, AC Input, Photo Transistor Coupler**
**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**
**Surface Mount (Gullwing) Lead Forming (U Type)**

**RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)**
**Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming**

**Surface Mount (Gullwing) Lead Forming**




**DIP4, AC Input, Photo Transistor Coupler**

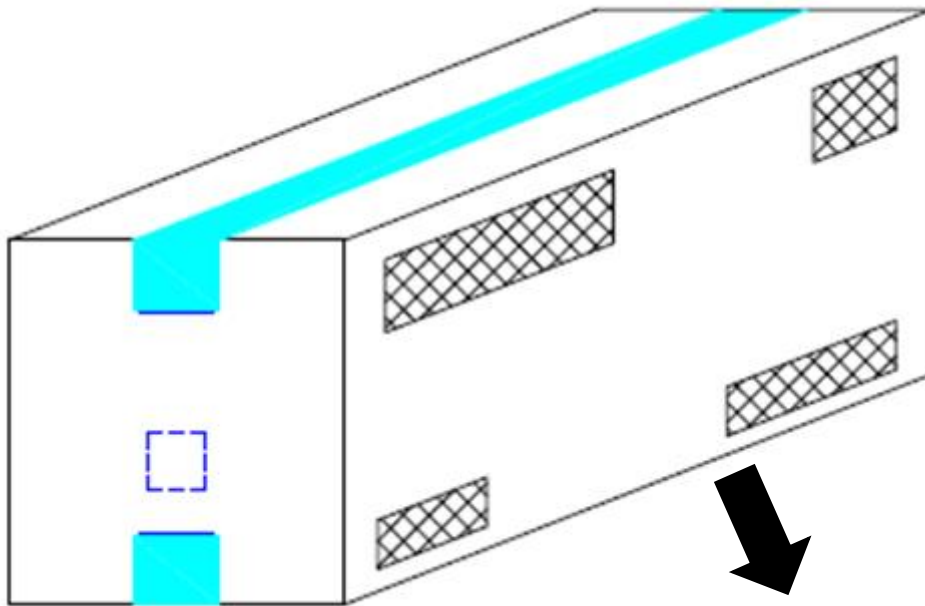
**TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

Packing Option 0 for N / M Type

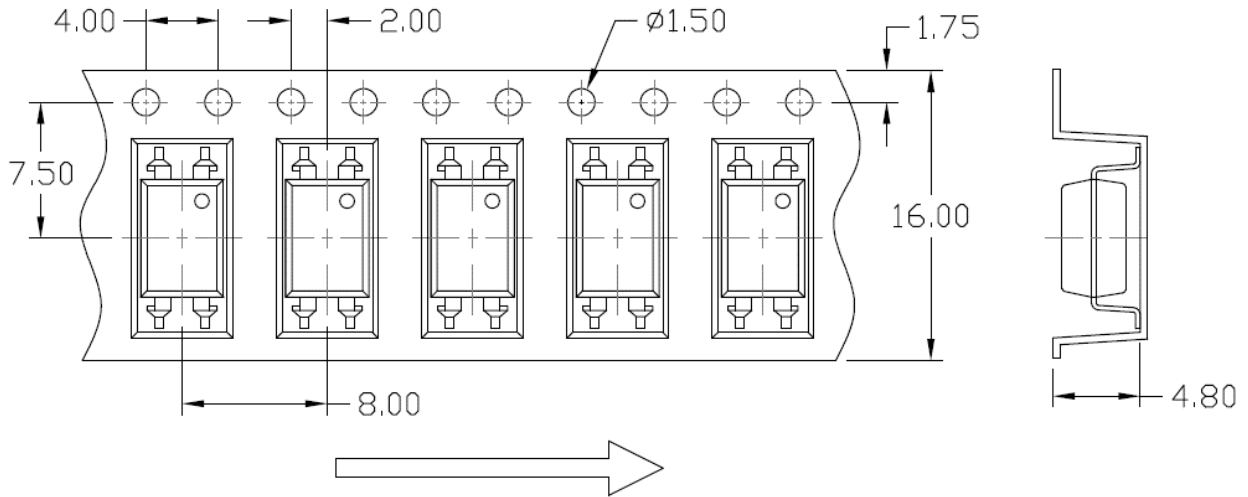
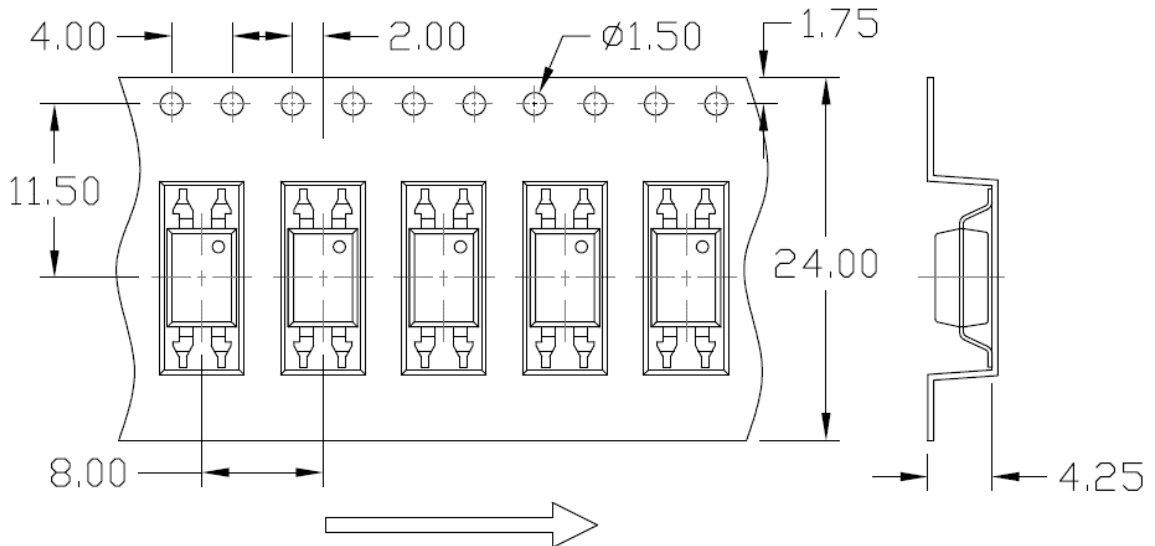


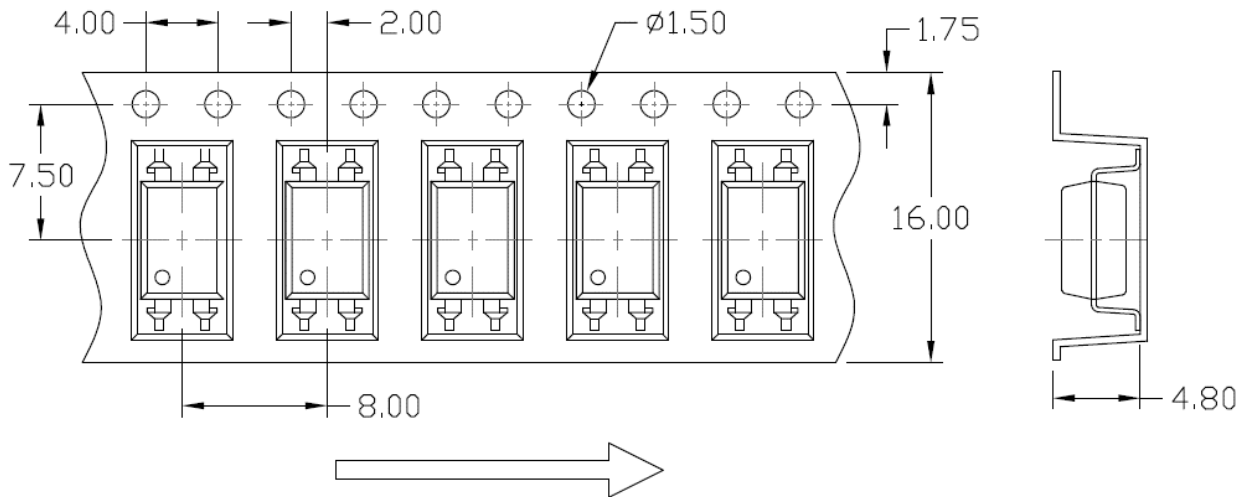
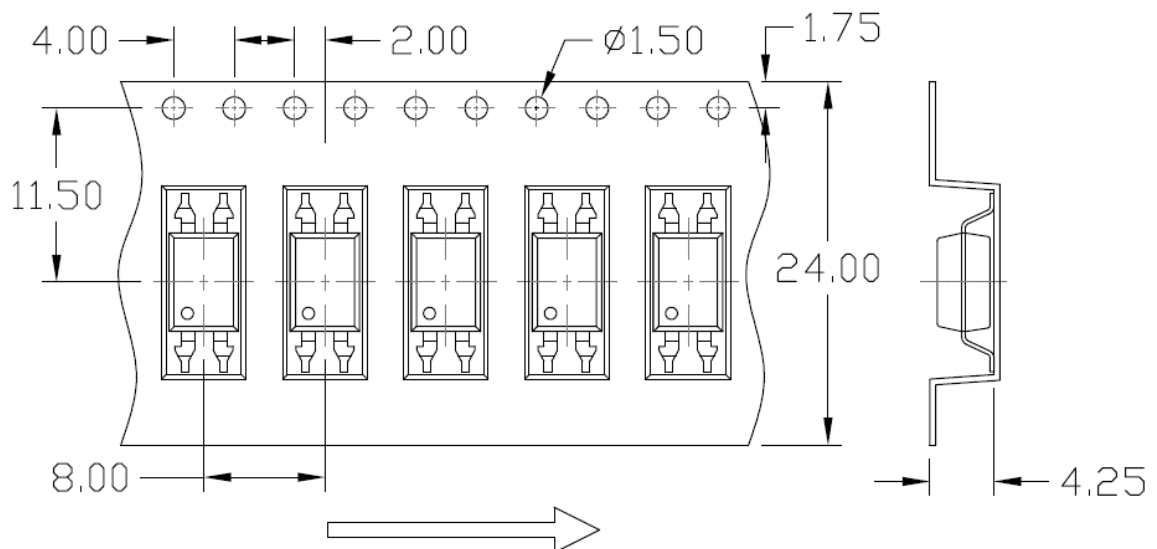
**DIP4, AC Input, Photo Transistor Coupler**
**BOX SPECIFICATIONS (Tube Type)**
**Inner Box**

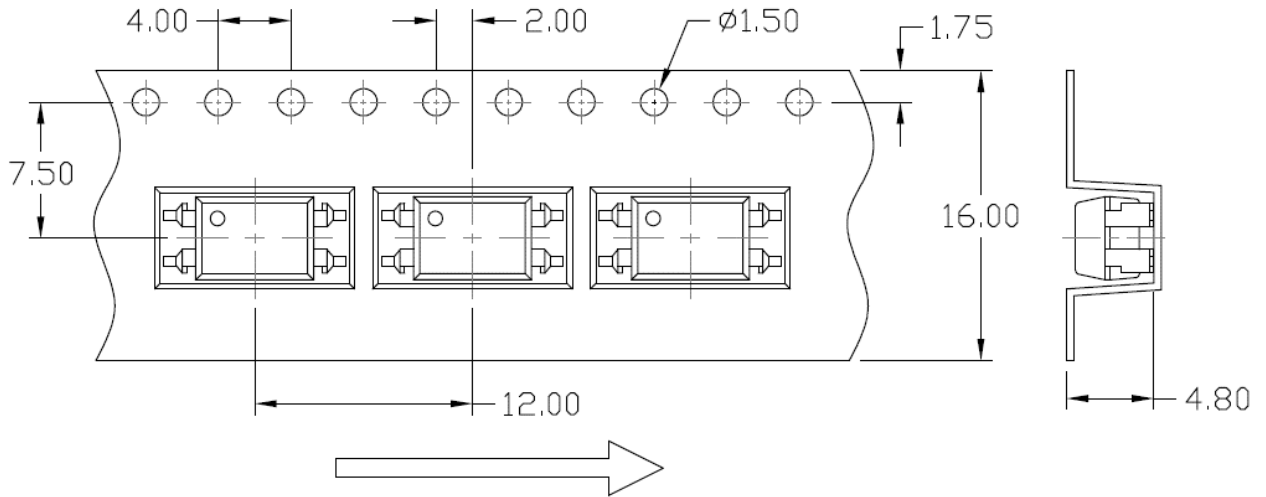
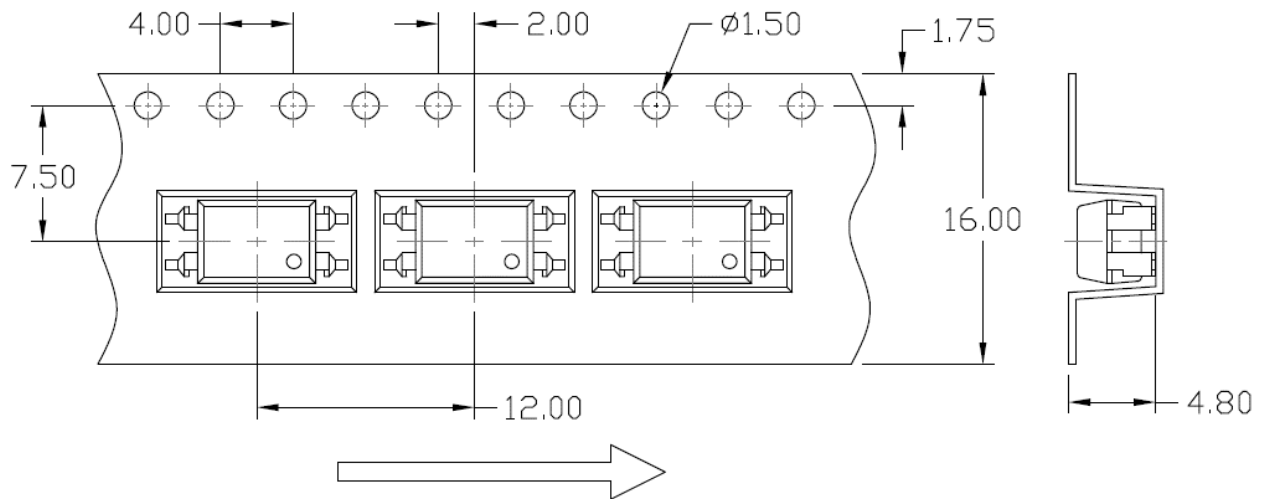

- L x W x H = 52.5cm x 10.7cm x 4.7cm

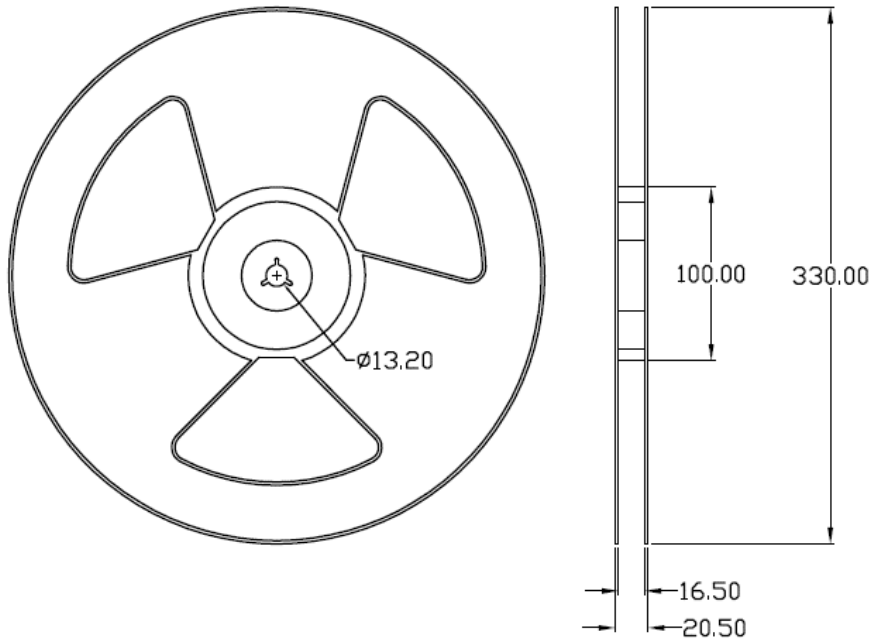
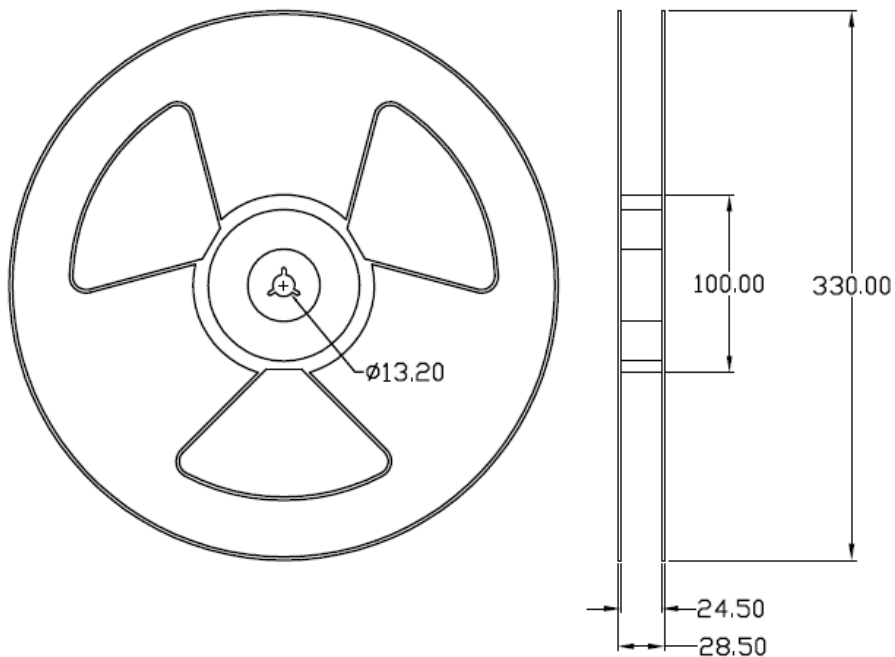
**Outer Box**


- L x W x H = 53.5cm x 23.5cm x 25.5cm

**DIP4, AC Input, Photo Transistor Coupler**
**CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**
**Packing Option 1 for S / T Type**

**Packing Option 1 for U Type**


**DIP4, AC Input, Photo Transistor Coupler**
**CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**
**Packing Option 2 for S / T Type**

**Packing Option 2 for U Type**


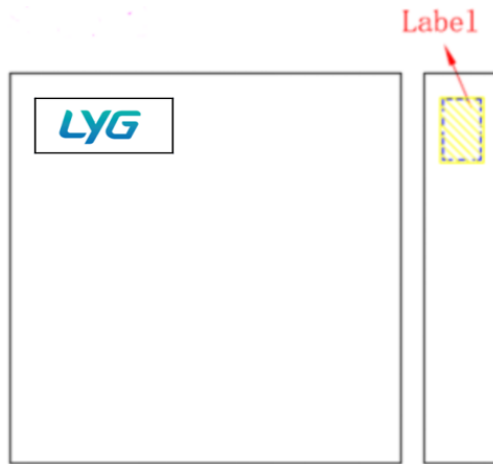
**DIP4, AC Input, Photo Transistor Coupler**
**CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**
**Packing Option 3 for S / T Type**

**Packing Option 4 for S / T Type**


**DIP4, AC Input, Photo Transistor Coupler**
**REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)**
**Reel Dimension for S / T Type**

**Reel Dimension for U Type**


**DIP4, AC Input, Photo Transistor Coupler**

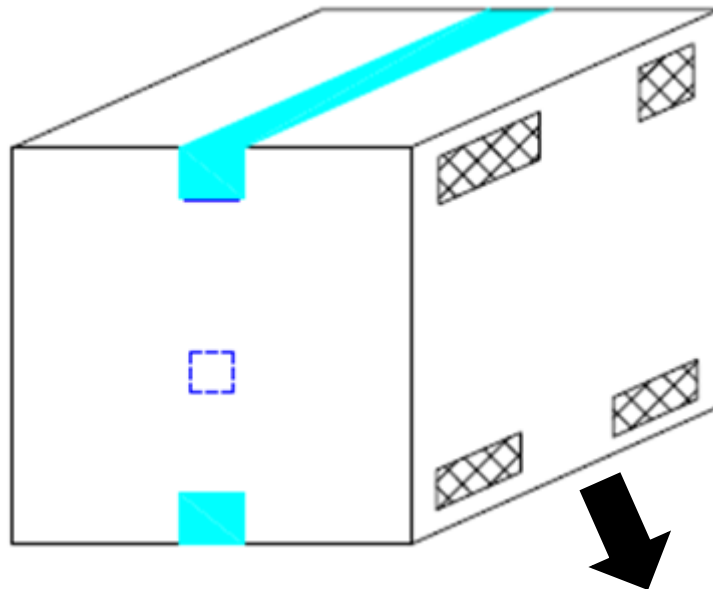
**BOX SPECIFICATIONS (Reel Type)**

**Inner Box**



- L x W x H = 36cm x 36cm x 6.9cm

**Outer Box**



- L x W x H = 45cm x 38cm x 38cm



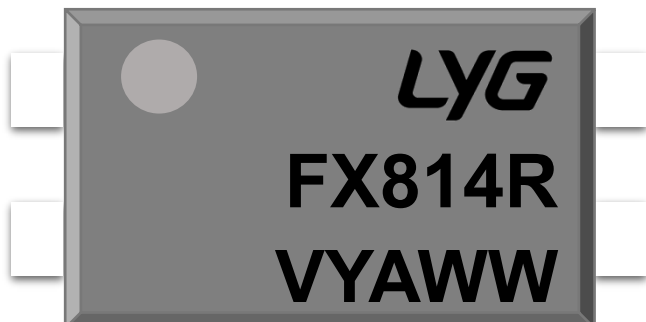




DIP4, AC Input, Photo Transistor Coupler

ORDERING AND MARKING INFORMATION

MARKING INFORMATION



**LYG** : Company Abbr.  
**FX814** : Part Number  
**R** : CTR Rank  
**V** : VDE Option  
**Y** : Fiscal Year  
**A** : Manufacturing Code  
**WW** : Work Week

ORDERING INFORMATION

LABEL INFORMATION

**FX814RVBTH-LZP1GCM**

FX814 – Part Number  
 R – Rank Option (0/A/B)  
 V – VDE  
 BTH – Fixed Character  
 L – Lead Form Option (N/M/S/T/U)  
 Z – Packing Option (0/1/2/3/4)  
 P1 – Fixed Character  
 G – Material Option  
 (G: Green Material / None: None Green Material)  
 C – Color Option(W: White / B: Black)  
 M – Leadframe Option  
 (F: Iron Leadframe / None: Copper Leadframe)

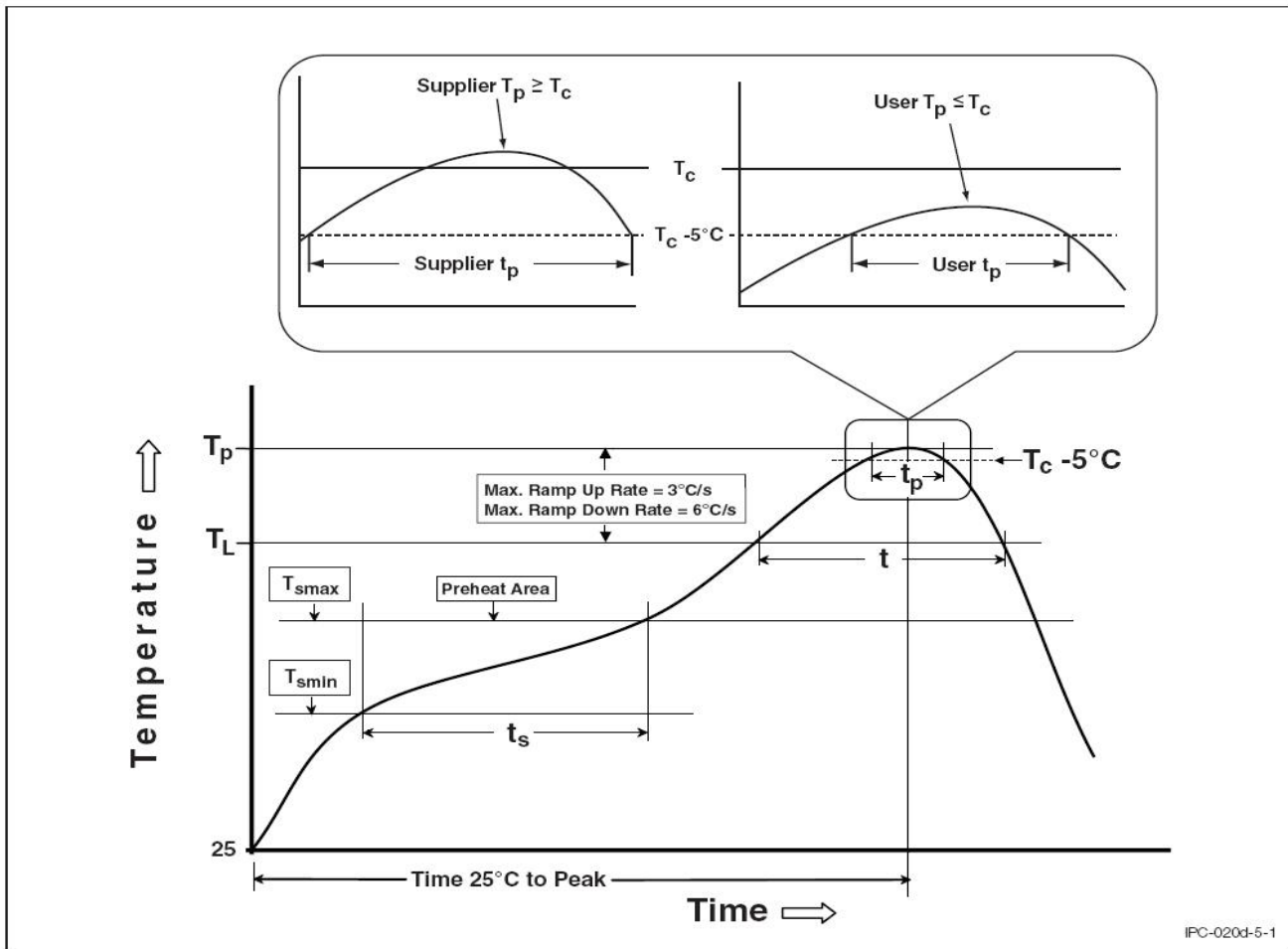
**LYG Semiconductor**

DEVICE: F\*\*\*\*\* \*  
 LOT NO: F4HM74.1-01  
 DATE CODE: 210101  
 QTY(EA): 3000  
 DATE: 2021/02/08

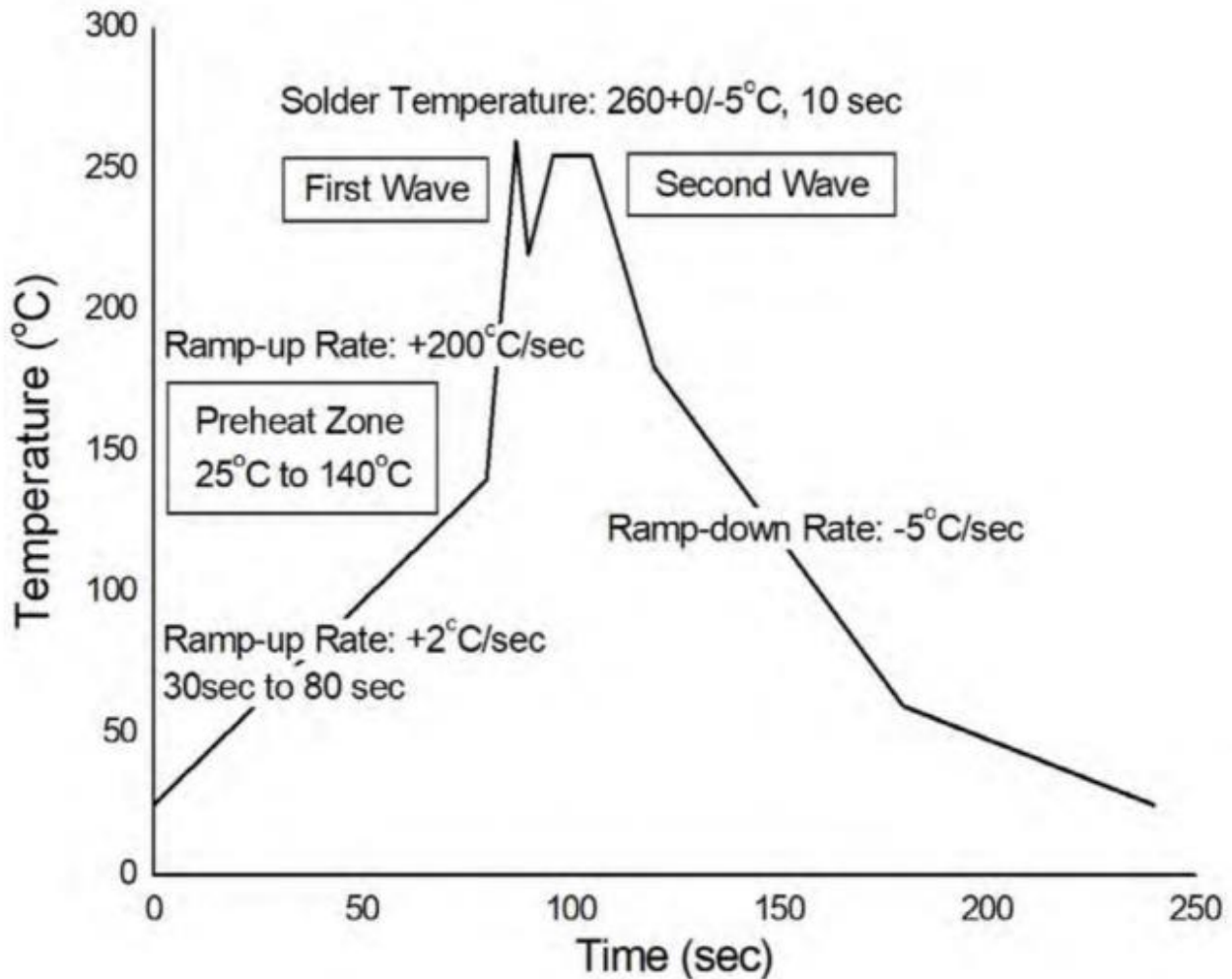
MSL: 1  
 CQC  
 D'E  
 Pb  
 LEAD FREE  
 RoHS / H.F.  
 QC Stamp

Packing Quantity

Option	Quantity	Quantity – Inner box	Quantity – Outer box
N0 / M0	100 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 32k Units
S1 / S2 / T1 / T2	1500 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 22.5k Units
S3 / S4 / T3 / T4 / U1 / U2	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units

**DIP4, AC Input, Photo Transistor Coupler**
**REFLOW INFORMATION**
**REFLOW PROFILE**


Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	100	150°C
Temperature Max. (T <sub>smax</sub> )	150	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds	60-120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	183°C	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (t <sub>P</sub> ) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

**DIP4, AC Input, Photo Transistor Coupler**
**TEMPERATURE PROFILE OF SOLDERING**
**WAVE SOLDERING (JESD22-A111 COMPLIANT)**

**HAND SOLDERING BY SOLDERING IRON**

Soldering Temperature	380±5°C
Soldering Time	3 sec max.

- One time soldering is recommended for all soldering method.
- Do not solder more than three times for IR reflow soldering.



**DIP4, AC Input, Photo Transistor Coupler**

**DISCLAIMER**

- LYG is continually improving the quality, reliability, function and design. LYG reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
- LYG makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, LYG disclaims (a) any and all liability arising out of the application or use of any product, (b) any and all liability, including without limitation special, consequential or incidental damages, and (c) any and all implied warranties, including warranties of fitness for particular
- The products shown in this publication are designed for the general use in electronic applications such as office automation, equipment, communications devices, audio/visual equipment, electrical application and instrumentation purpose, non-infringement and merchantability.
- This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
- Please contact LYG sales agent for special application request.
- Immerge unit's body in solder paste is not recommended.
- Parameters provided in datasheets may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated in each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify LYG's terms and conditions of purchase, including but not limited to the warranty expressed therein.
- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.