



# HK303X, HK304X, HK306X, HK308X

## 6-Pin DIP Zero-Cross Triac Driver Photocouplers

### Description

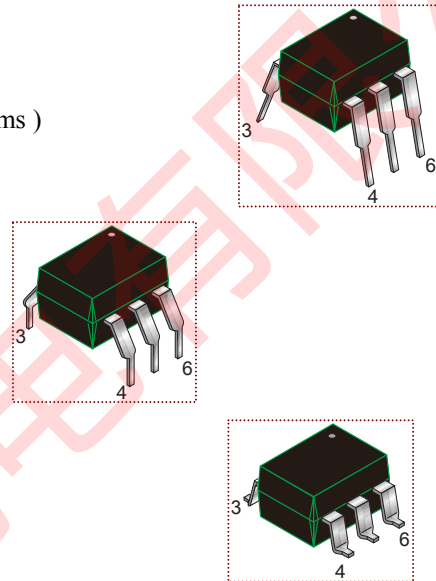
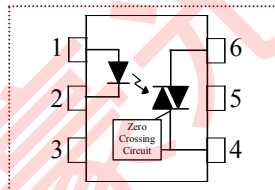
The HK303X, HK304X, HK306X, HK308X series of devices each consists of a GaAs infrared emitting diode optically coupled to a monolithic silicon Zero-Cross photo Triac.

### Features

- Peak breakdown voltage,
  - 250V: HK303X
  - 400V: HK304X
  - 600V: HK306X
  - 800V: HK308X
- High isolation voltage between input and output ( $V_{iso}=5000V$  rms)
- Zero voltage crossing
- Compact dual-in-line package
- Pb free and RoHS compliant.
- UL approved
- VDE approved

### Applications

- Solenoid/valve controls
- Light controls
- Static power switch
- AC motor drivers
- E.M. contactors
- Temperature controls
- AC Motor starters
- Solid state relays



### Block Diagram and Package

### Absolute Maximum Ratings ( $T_a=25^\circ C$ )

Parameter		Symbol	Rating	Unit
Input	Forward Current	$I_F$	60	mA
	Reverse Voltage	$V_R$	6	V
	Power Dissipation	$P_D$	100	mW
	Derating Factor (above $T_a = 85^\circ C$ )		3.8	mW/ $^\circ C$
Output	Off-state Output Terminal Voltage	$V_{DRM}$	250	V
			400	
			600	
			800	
	Peak Repetitive Surge Current (pw=100 $\mu$ s, 120pps)	$I_{TSM}$	1	A
	On-State RMS Current	$I_{T(RMS)}$	100	mA
Power Dissipation	$P_C$	300	mW	
		Derating Factor (above $T_a = 85^\circ C$ )	7.6	mW/ $^\circ C$
Total Power Dissipation		$P_{tot}$	330	mW
Isolation Voltage *		$V_{iso}$	5000	Vrms
Operating Temperature		$T_{opr}$	-55~+100	$^\circ C$



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Parameter	Symbol	Rating	Unit
Storage Temperature	T <sub>stg</sub>	-55~+125	°C
Soldering Temperature (10s)	T <sub>sol</sub>	260	°C

\* AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.

### Electro-optical Characteristics (Ta=25°C, unless specified otherwise)

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit					
Input	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> =30mA	-	-	1.5	V					
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> =6V	-	-	10	μA					
Output	Peak Blocking Current	HK303X	V <sub>DRM</sub> = Rated V <sub>DRM</sub> , I <sub>F</sub> = 0mA	-	-	100	nA					
		HK304X										
	HK306X											
	HK308X											
	Peak On-state Voltage		V <sub>TM</sub>	I <sub>TM</sub> =100mA peak, I <sub>F</sub> =Rated I <sub>FT</sub>	-	-	3	V				
	Critical Rate of Rise off-state Voltage	HK303X HK304X HK306X HK308X	dv/dt	V <sub>PEAK</sub> = Rated V <sub>DRM</sub> , I <sub>F</sub> =0	1000	-	-	V/μs				
600					-	-						
Inhibit Voltage (MT1-MT2 voltage above which device will not trigger)		V <sub>INH</sub>	I <sub>F</sub> = Rated I <sub>FT</sub>	-	-	20	V					
Leakage in Inhibited State		I <sub>DRM2</sub>	I <sub>F</sub> = Rated I <sub>FT</sub> , V <sub>DRM</sub> =Rated V <sub>DRM</sub> , off state	-	-	500	μA					
Transfer Characteristics	LED Trigger Current	HK3031 HK3041 HK3061 HK3081	Main terminal Voltage=3V			15	mA					
		HK3032 HK3042 HK3062 HK3082				10						
		HK3033 HK3043 HK3063 HK3083				5						
		Holding Current				I <sub>H</sub>		-	280	-	μA	

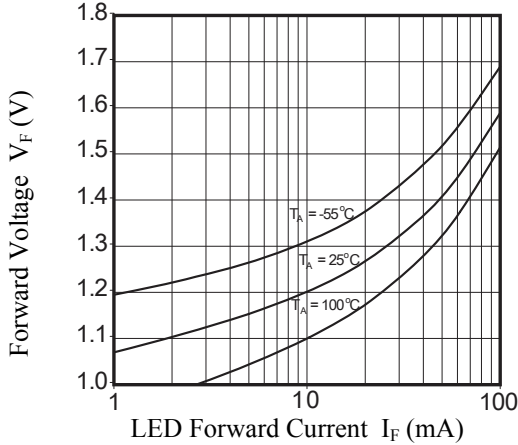


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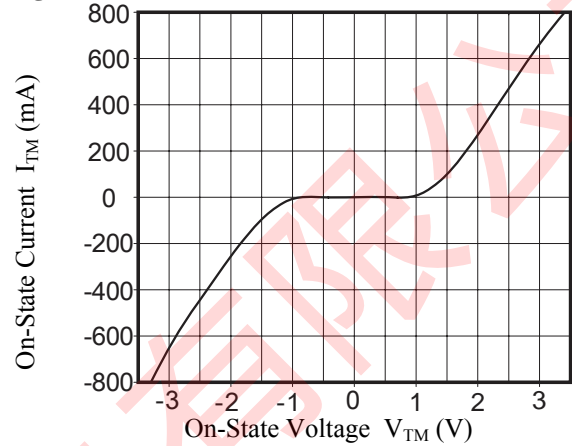
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### Typical Electro-Optical Characteristics Curves

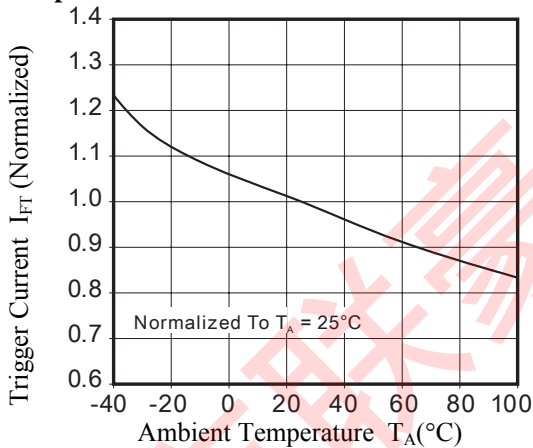
**Fig.1 LED Forward Voltage vs Forward Current**



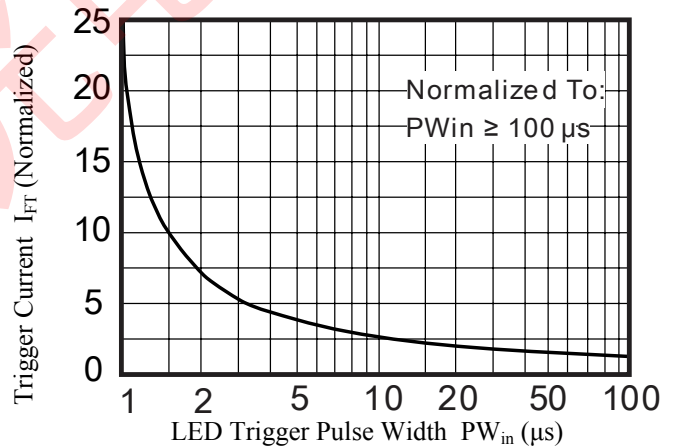
**Fig.2 On-State Characteristics**



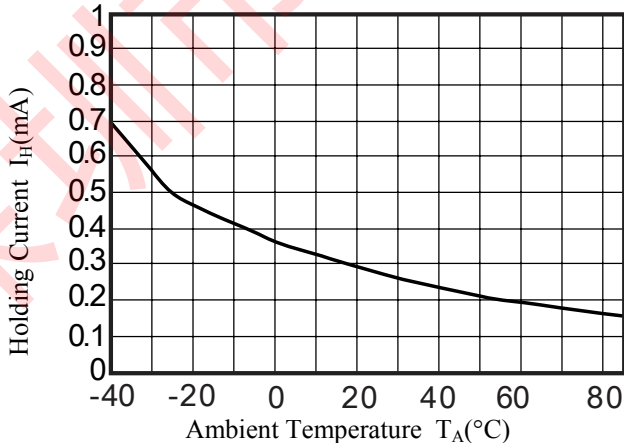
**Fig.3 Trigger Current vs. Ambient Temperature**



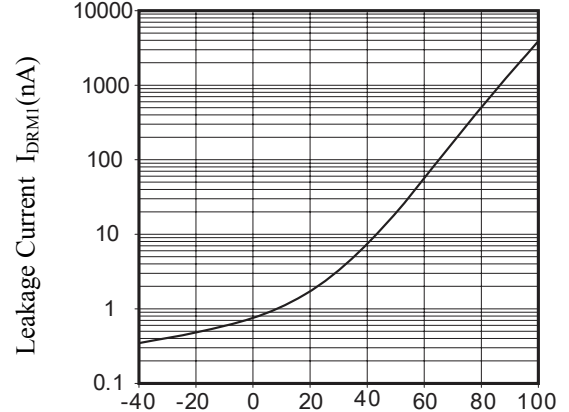
**Fig.4 LED Current Required to Trigger vs. LED Pulse Width**



**Fig.5 Holding Current vs. Temperature**



**Fig.6 Leakage Current vs. Temperature**





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Fig.7  $I_{DRM2}$ , Leakage in Inhibit State vs. Temperature

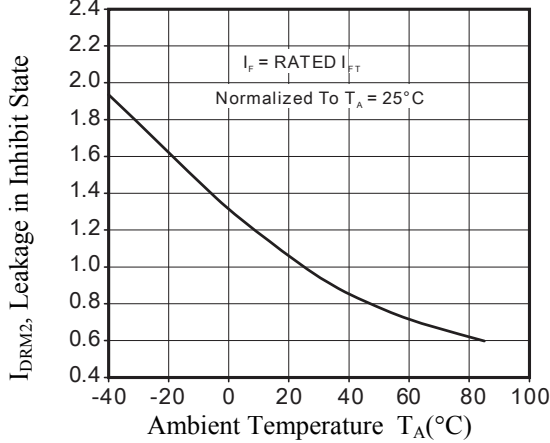


Fig.8 Inhibit Voltage vs. Temperature

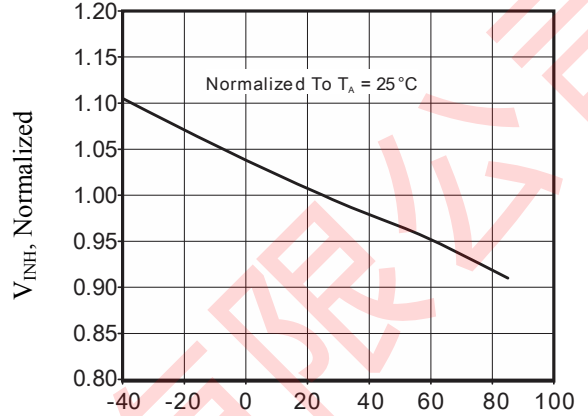
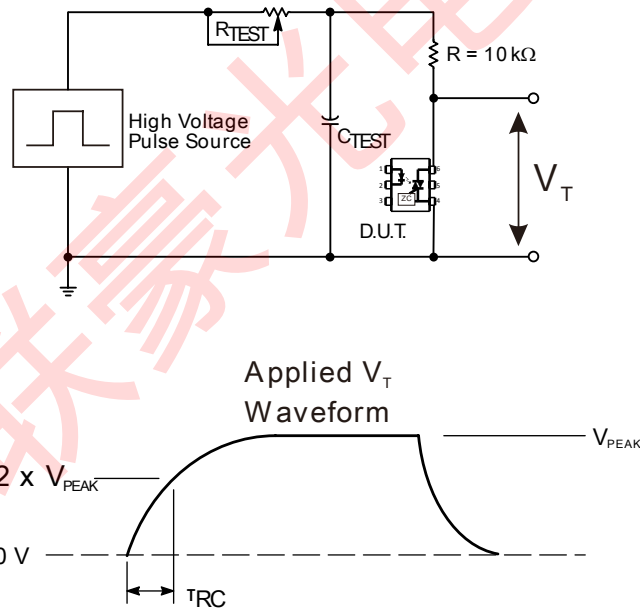


Fig.9 Static dv/dt Test Circuit & Waveform



The high voltage pulse is set to the required  $V_{PEAK}$  value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform  $V_T$  is monitored using an x100 scope probe. By varying  $R_{TEST}$ , the dv/dt (slope) is increased, until the D.U.T. is observed to trigger (waveform collapses). The dv/dt is then decreased until the D.U.T. stops triggering. At this point,  $\tau_{RC}$  is recorded and the dv/dt calculated.

$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

For example,  $V_{PEAK} = 400V$  for HK304X series. The dv/dt value is calculated as follows:

$$dv/dt = \frac{0.632 \times 400}{\tau_{RC}} = \frac{252}{\tau_{RC}}$$

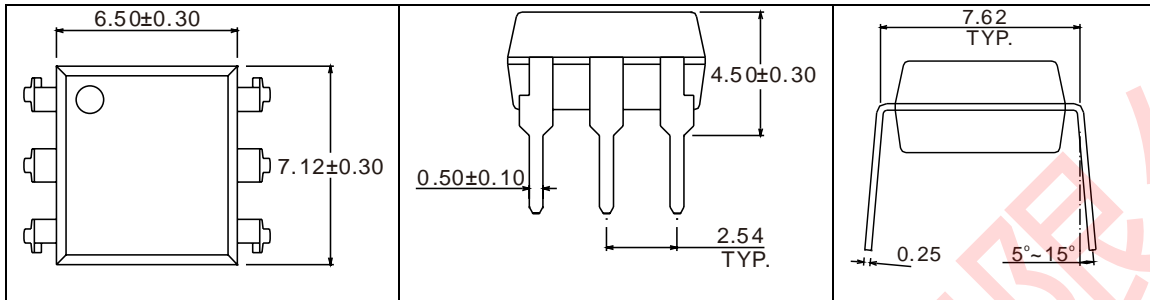


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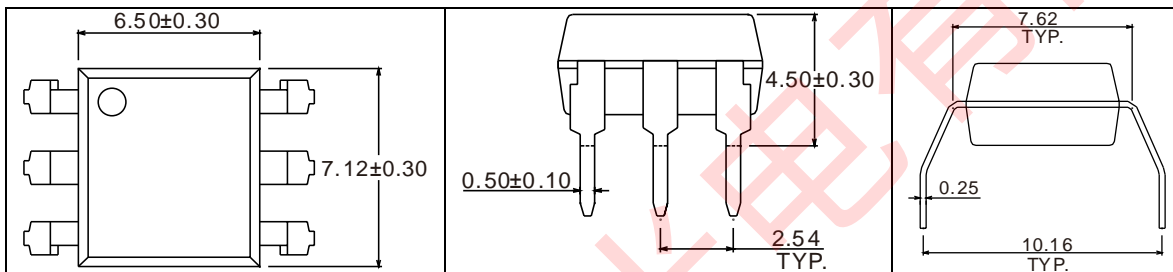
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### Outline Dimensions

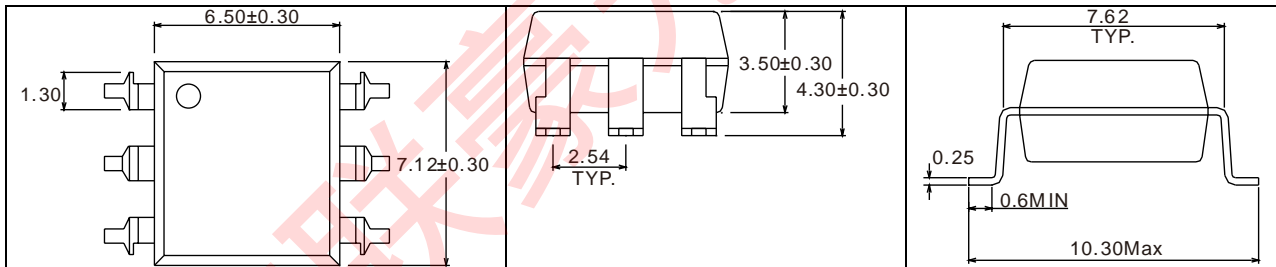
Unit: mm



6-pin DIP



6-pin DIP (M Type)



6-pin SMD



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### Marking

HK30VT  
YYWW

- “V” denotes  $V_{DRM}$  digit: 3/4/6/8; “T” denotes  $I_{FT}$  digit: 1/2/3
- “YY” denotes YEAR; “WW” denotes WEEK

### Device Table

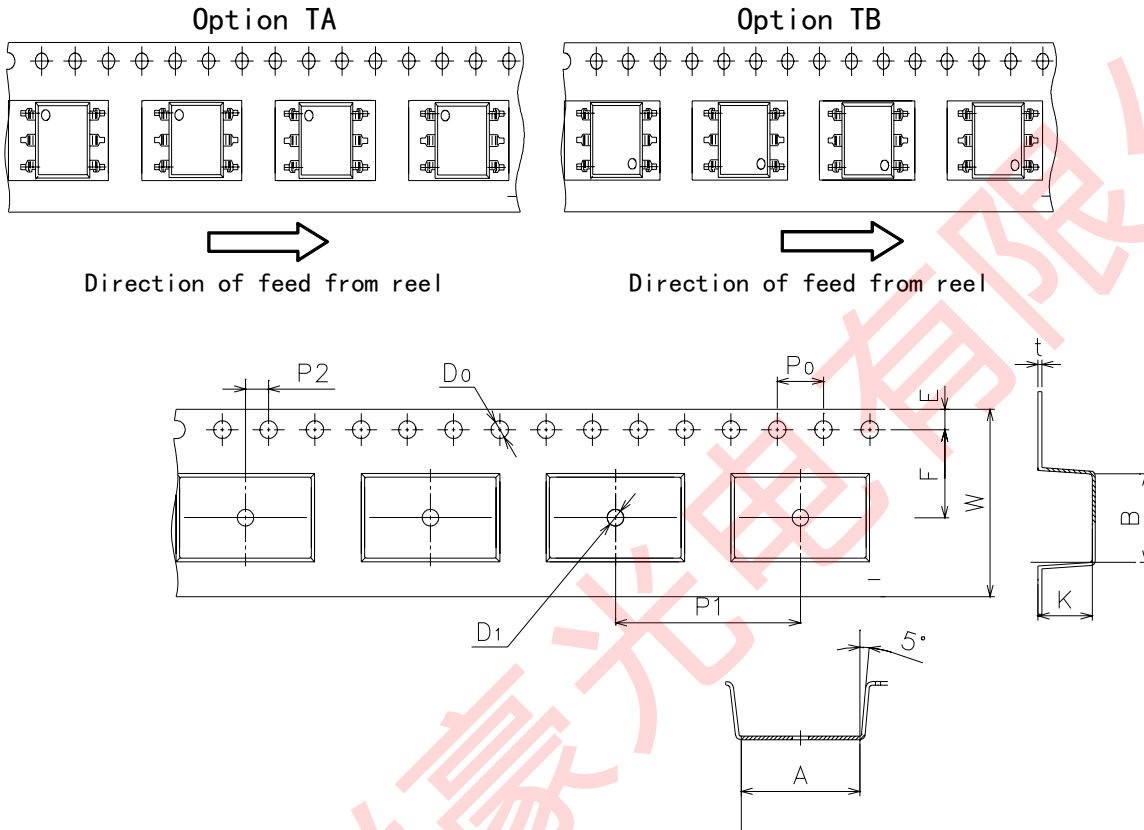
Part Name	Main Marking	Package
HK3031D/M/S	HK3031	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3032D/M/S	HK3032	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3033D/M/S	HK3033	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3041D/M/S	HK3041	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3042D/M/S	HK3042	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3043D/M/S	HK3043	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3061D/M/S	HK3061	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3062D/M/S	HK3062	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3063D/M/S	HK3063	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3081D/M/S	HK3081	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3082D/M/S	HK3082	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD
HK3083D/M/S	HK3083	6-pin DIP / 6-pin DIP (M Type) / 6-pin SMD



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### Tape & Reel Packing



Dimension No.	A	B	D0	D1	E	F
Dimension (mm)	10.4±0.1	7.5±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1

Dimension No.	P0	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1



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