

芯伯乐®  
X I N B O L E

# Product Specification

XBL357X

4-Pin SOP Phototransistor Optocouplers

WEB | [www.xinboleic.com](http://www.xinboleic.com)



### Descriptions

The XBL357 series contains an infrared emitting diode, optically coupled to a phototransistor detector. The devices in a 4-pin small outline SOP package.

### Features

- DC Input Response
- Current Transfer Ratio in Selected Groups
  - XBL357: 50–600%
  - XBL357A: 80–160%
  - XBL357B: 130–260%
  - XBL357C: 200–400%
  - XBL357D: 300–600%
- Minimum  $V_{CE0}$  of 70 V Guaranteed
- High isolation voltage between input and output ( $V_{iso}=3750V$  rms )
- This Device is Pb-Free
- Adopting SOP-4-2.54mm package



### Applications

- Power Supply Regulators
- Digital Logic Inputs
- Microprocessor Inputs

### Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty	CTR Value*
XBL357-TAG	SOP-4-2.54mm	357	Tape	3000Pcs/Reel	50-600%
XBL357A-TAG	SOP-4-2.54mm	357A	Tape	3000Pcs/Reel	80-160%
XBL357B-TAG	SOP-4-2.54mm	357B	Tape	3000Pcs/Reel	130-260%
XBL357C-TAG	SOP-4-2.54mm	357C	Tape	3000Pcs/Reel	200-400%
XBL357D-TAG	SOP-4-2.54mm	357D	Tape	3000Pcs/Reel	300-600%

\*Notes:  $I_F=5mA, V_{CE}=5V, T_A=25^{\circ}C$

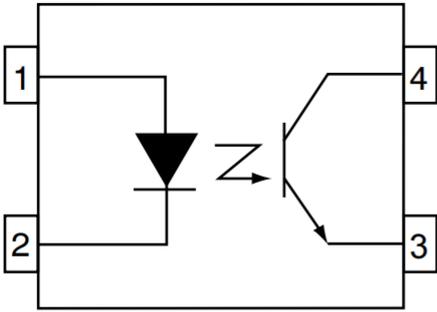
### Product Model

## XBL357X-YG

Note

- X = CTR Rank(A, B, C, D or none)
- Y = Tape and reel option (TA, TB or none)
- G = Halogen free

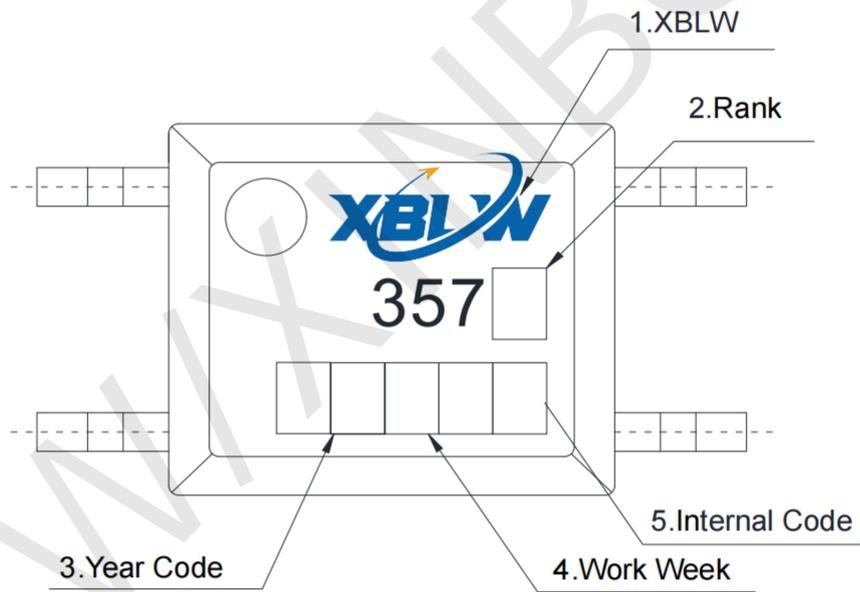
### Block Diagram



### Pin Configurations

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

### Naming Rule



- 1.XBLW LOGO
- 2.CTR Rank
- 3.Year Code, Example : 2023=23
- 4.Work Week Ranging from '01' to '53'
- 5.Internal Code

**ABSOLUTE MAXIMUM RATINGS**  $T_A = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	Value	Unit
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**TOTAL DEVICE**

$T_{\text{STG}}$	Storage Temperature	-55 to +150	°C
$T_{\text{OPR}}$	Operating Temperature	-55 to +110	
$T_J$	Junction Temperature	-55 to +125	
$T_{\text{SOL}}$	Lead Solder Temperature	260 for 10 s	
$\theta_{\text{JC}}$	Junction-to-Case Thermal Resistance	210	°C/W
$P_{\text{TOT}}$	Total Device Power Dissipation	200	mW

Symbol	Parameter	Value	Unit
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**EMITTER**

$I_F$	Continuous Forward Current	50	mA
$V_R$	Reverse Voltage	6	V
$P_D$	Power Dissipation	70	mW
	Derate Above 100 °C	1.7	mW/°C

**DETECTOR**

$V_{\text{CEO}}$	Collector-Emitter Voltage	70	V
$V_{\text{ECO}}$	Emitter-Collector Voltage	6	
$I_C$	Continuous Collector Current	50	mA
$P_C$	Collector Power Dissipation	150	mW
	Derate Above 90 °C	2.9	mW/°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**ELECTRICAL CHARACTERISTICS**  $T_A = 25^\circ\text{C}$  unless otherwise specified.

**INDIVIDUAL COMPONENT CHARACTERISTICS**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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**Emmitter**

$V_F$	Forward Voltage	$I_F = 20 \text{ mA}$	-	1.2	1.4	V
$I_R$	Reverse Current	$V_R = 4.0 \text{ V}$			10	$\mu\text{A}$
$C_t$	Terminal Capacitance	$V = 0, f = 1 \text{ kHz}$		30	250	pF

**Detector**

$I_{\text{CEO}}$	Collector Dark Current	$V_{\text{CE}} = 20 \text{ V}, I_F = 0$	-		100	nA
$BV_{\text{CEO}}$	Collector-Emitter Breakdown Voltage	$I_C = 0.1 \text{ mA}, I_F = 0$	70	-		V
$BV_{\text{ECO}}$	Emitter-Collector Breakdown Voltage	$I_E = 10 \mu\text{A}, I_F = 0$	6	-	-	

**DC TRANSFER CHARACTERISTICS**

Symbol	Parameter	Device	Test Conditions	Min	Typ	Max	Unit
CTR	Current Transfer Ratio (Note 1)	XBL357	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	50	–	600	%
		XBL357A		80		160	
		XBL357B		130	–	260	
		XBL357C		200	–	400	
		XBL357D		300		600	
$V_{CE(SAT)}$	Collector–Emitter Saturation Voltage	XBL357 Series	$I_F = 20 \text{ mA}, I_C = 1 \text{ mA}$	–	0.1	0.2	V

**ELECTRICAL CHARACTERISTICS**  $T_A = 25^\circ\text{C}$  unless otherwise specified. (continued)

**AC TRANSFER CHARACTERISTICS**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$f_c$	Cut–Off Frequency	$V_{CE} = 5 \text{ V}, I_C = 2 \text{ mA}, R_L = 100 \Omega, -3 \text{ dB}$	15	80	–	kHz
$t_r$	Response Time (Rise)	$V_{CE} = 2 \text{ V}, I_C = 2 \text{ mA}, R_L = 100 \Omega$ (Note 2)	–	4	18	$\mu\text{s}$
$t_f$	Response Time (Fall)		–	3	18	

**ISOLATION CHARACTERISTICS**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{ISO}$	Input–Output Isolation Voltage (Note 3)	$f = 60 \text{ Hz}, t = 1 \text{ min}, I_{I-O} \leq 2 \mu\text{A}$	5000			$V_{ACRMS}$
$R_{ISO}$	Isolation Resistance	$V_{I-O} = 500 \text{ V}_{DC}$	$5 \times 10^{10}$	$1 \times 10^{11}$	–	$\Omega$
$C_{ISO}$	Isolation Capacitance	$V_{I-O} = 0, f = 1 \text{ MHz}$	–	0.6	1.0	pf

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Current Transfer Ratio (CTR) =  $I_C / I_F \times 100\%$
2. For test circuit setup and waveforms, refer to page 6 to 8 .
3. For this test, Pins 1 and 2 are common, and Pins 3 and 4 are common.

**TYPICAL ELECTRICAL/OPTICAL CHARACTERISTICS CURVES**

TA = 25 °C unless otherwise specified.

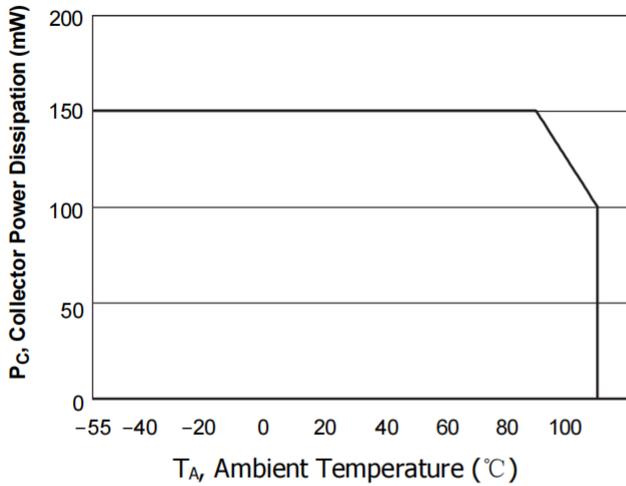


Figure 1 . Collector Power Dissipation vs. Ambient Temperature

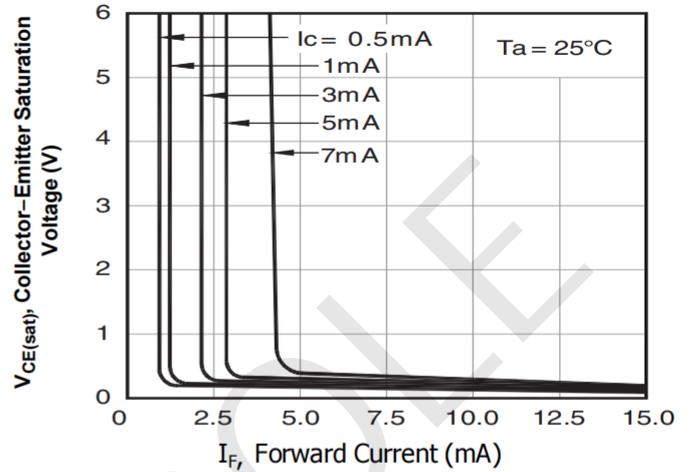


Figure 2 . Collector-Emitter Saturation Voltage vs. Forward Current

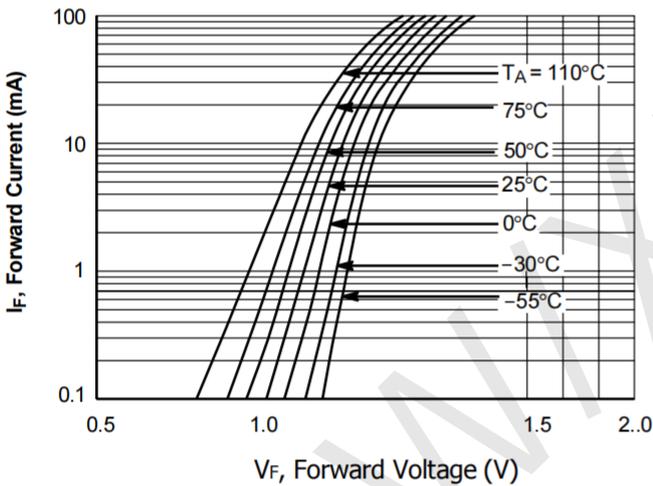


Figure 3 . Forward Current vs. Forward Voltage

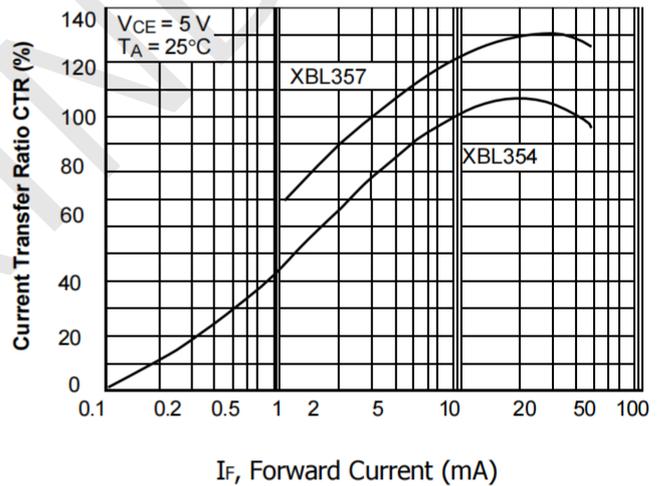


Figure 4 . Current Transfer Ratio vs. Forward Current

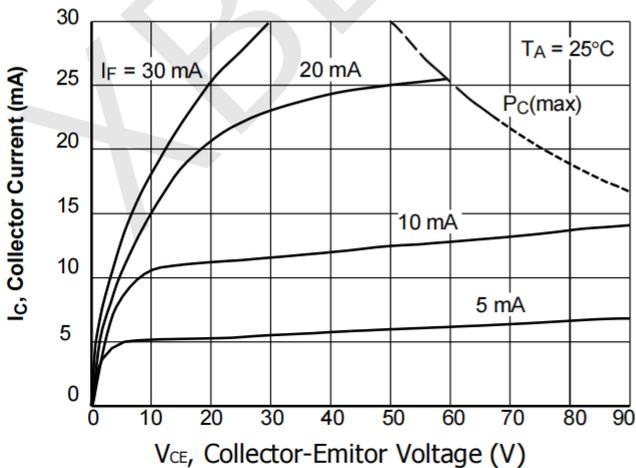


Figure 5 . Collector Current vs. Collector-Emitor Voltage

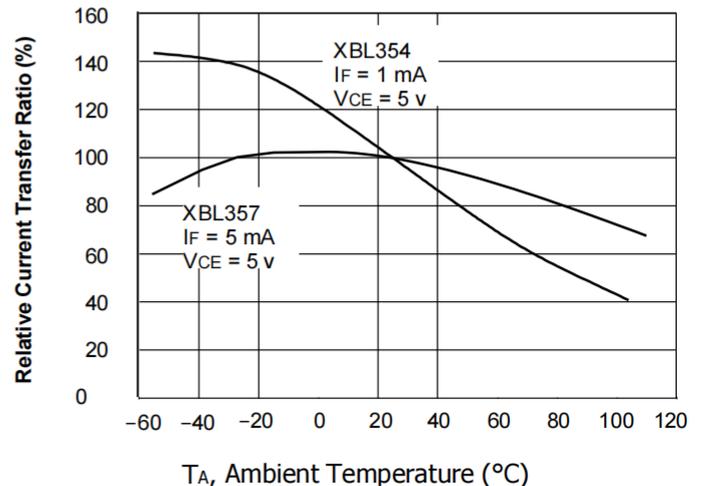
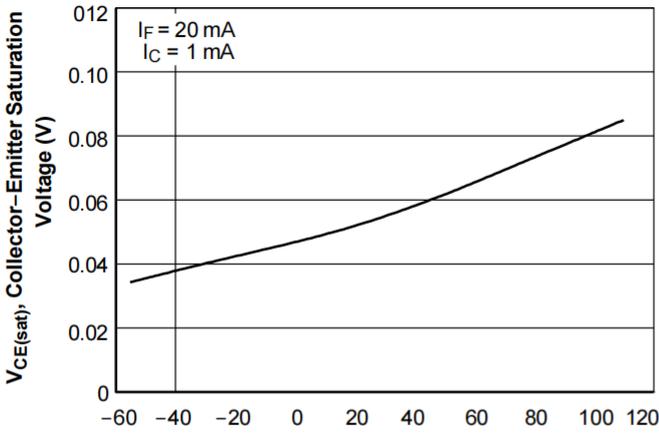
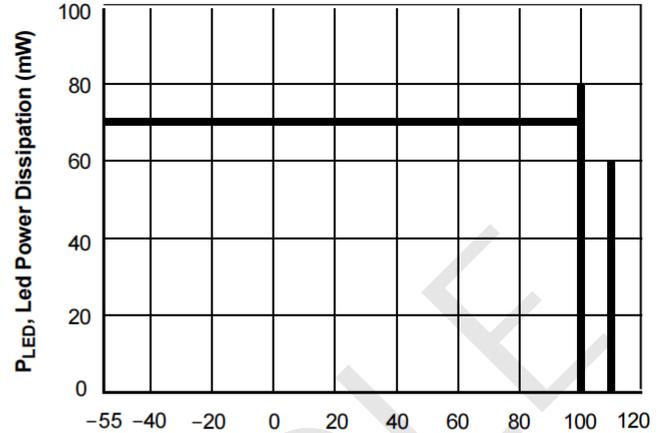


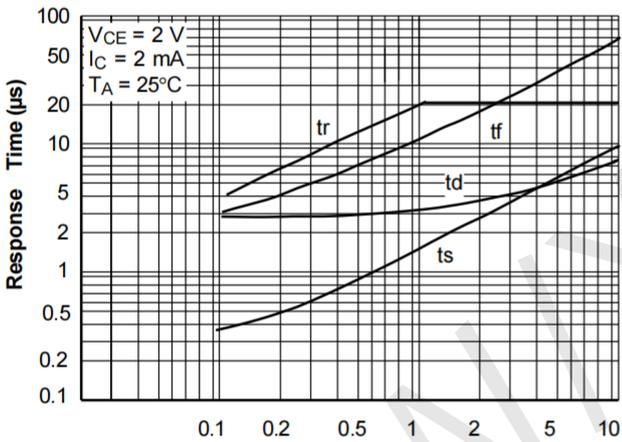
Figure 6 . Relative Current Transfer Ratio vs. Ambient Temperature



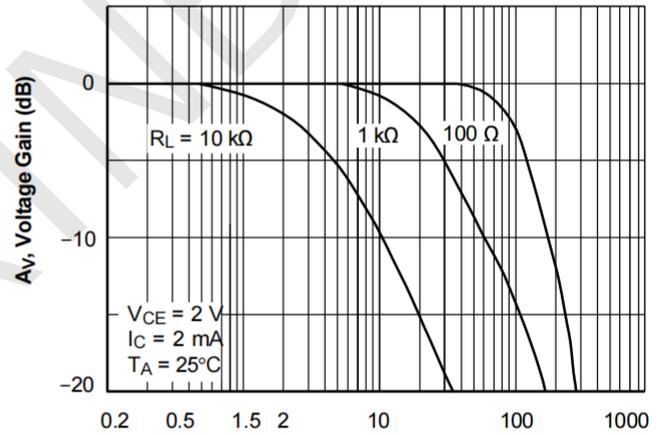
$T_A$ , Ambient Temperature ( $^{\circ}\text{C}$ )  
Figure 7 . Collector-Emitter Saturation Voltage vs. Ambient Temperature



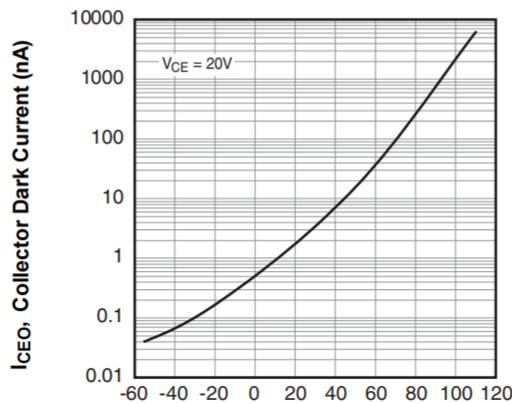
$T_A$ , Ambient Temperature ( $^{\circ}\text{C}$ )  
Figure 8 . Led Power Dissipation vs. Ambient Temperature



$R_L$ , Load Resistance ( $\text{k}\Omega$ )  
Figure 9 . Response Time vs. Load Resistance

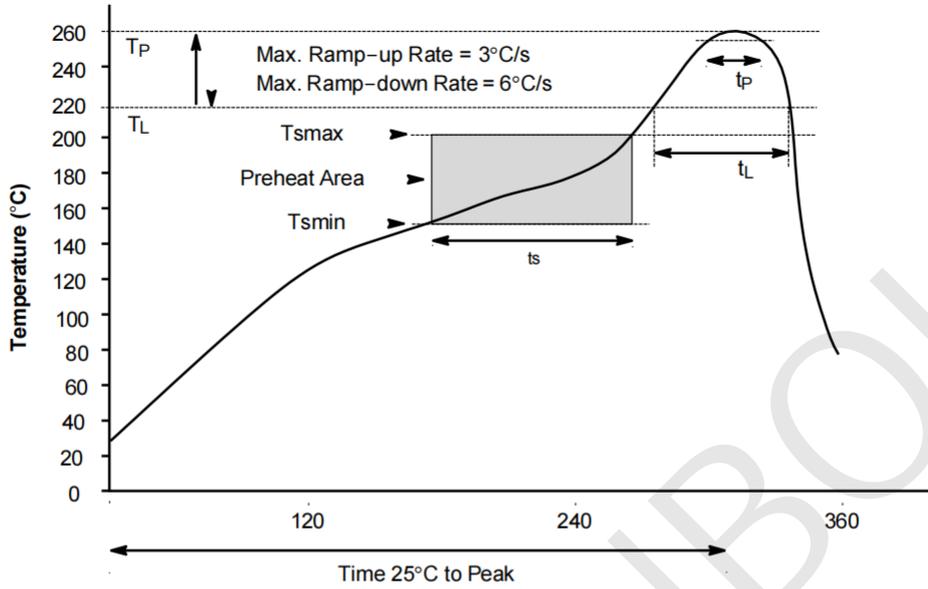


$f$ , Frequency ( $\text{kHz}$ )  
Figure 10. Frequency Response



$T_A$ , Ambient Temperature ( $^{\circ}\text{C}$ )  
Figure 11. Collector Dark Current vs. Ambient Temperature

**REFLOW PROFILE**



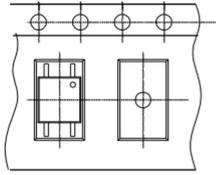
Time (s)  
Figure 12.  
Reflow Profile

**REFLOW PROFILE**

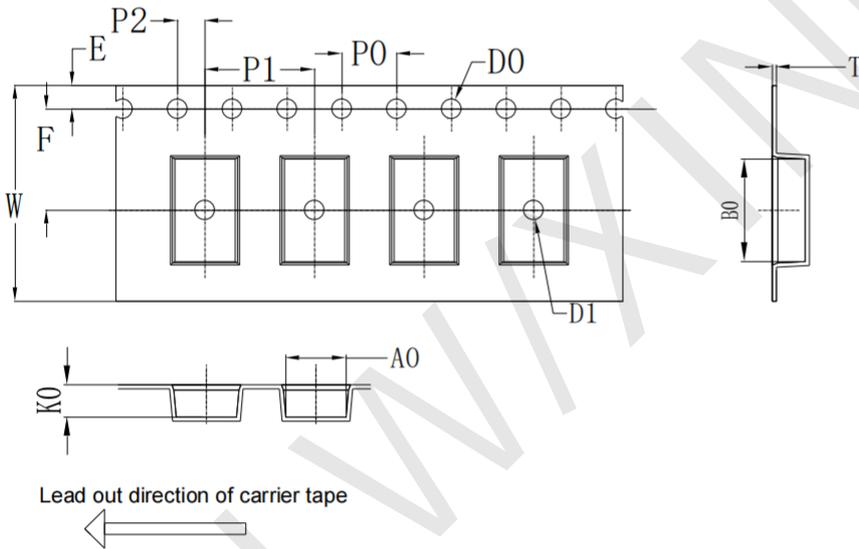
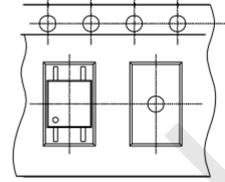
Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmín)	150 °C
Temperature Max. (Tsmáx)	200 °C
Time (ts) from (Tsmín to Tsmáx)	60–120 s
Ramp-up Rate (tL to tP)	3 °C/s max.
Liquidous Temperature (TL)	217 °C
Time (tL) Maintained Above (TL)	60–150 s
Peak Body Package Temperature	260 °C +0 °C / -5 °C
Time (tp) within 5 °C of 260 °C	30 s
Ramp-down Rate (TP to TL)	6 °C/s max.
Time 25°C to Peak Temperature	8 min max.

**Tape & Reel Packing Specifications**

**Option TA**



**Option TB**

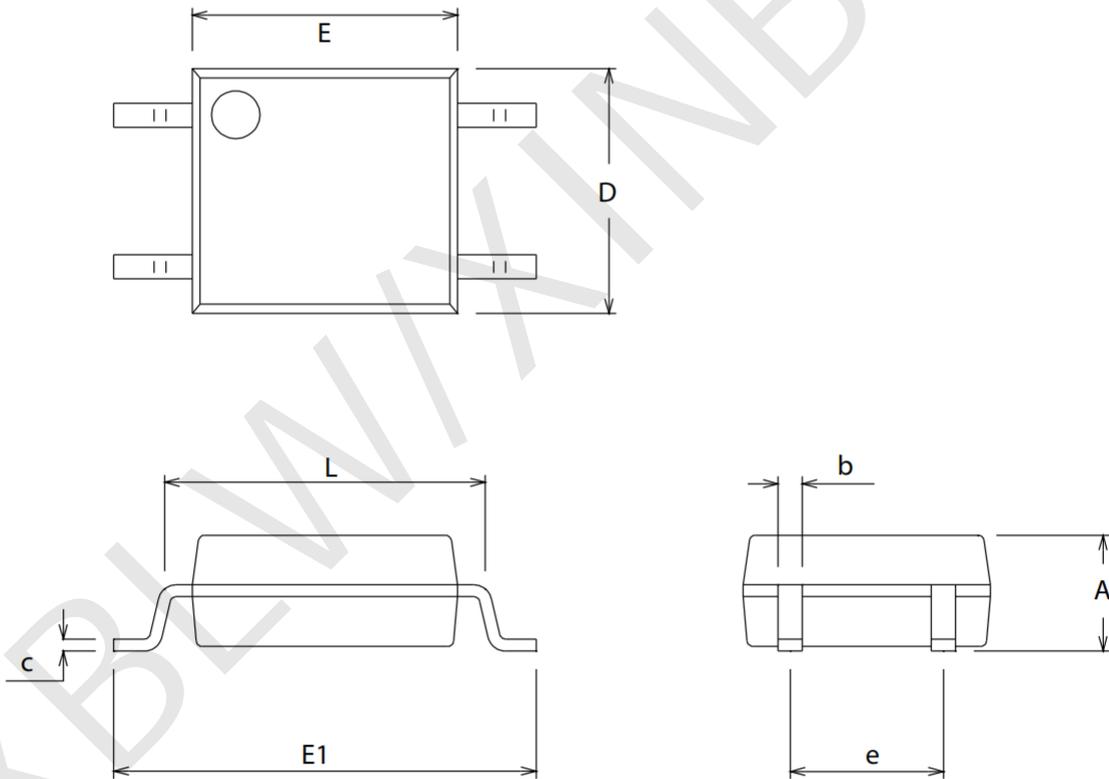


ITEM	DIM(mm)
W	16±0.20
A <sub>0</sub>	4.4±0.10
B <sub>0</sub>	7.60±0.10
K <sub>0</sub>	2.40±0.10
P <sub>1</sub>	8.00±0.10
F	7.50±0.10
E	1.75±0.10
D <sub>0</sub> /D <sub>1</sub>	1.50±0.10
P <sub>0</sub>	4.00±0.10
P <sub>2</sub>	2.00±0.10
T	0.30±0.03

**Package Dimension**

- SOP-4-2.54mm

SIZE SYMBOL	Dimensions In Millimeters		SIZE SYMBOL	Dimensions In Inches	
	DIM(mm)			DIM(in)	
A	MAX2.0		A	0.0787	
L	5.2±0.2		L	0.205±0.00787	
e	2.54±0.02		e	0.1±0.000787	
b	0.4±0.1		b	0.0157±0.00394	
c	0.2		c	0.0078	
D	4.0±0.2		D	0.0157±0.00787	
E	4.4±0.05		E	0.173±0.00197	
E1	7.0±0.3		E1	0.276±0.0118	



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