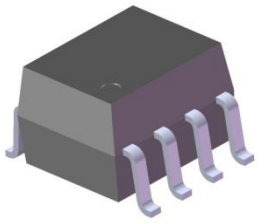
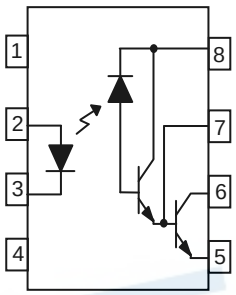
DATASHEET

8 PIN SOP LOW INPUT CURRENT HIGH GAIN SPLIT DARLINGTON PHOTOCOUPLER
EL0700_EL0701 Series



Schematic



Pin Configuration
1. No Connection
2. Anode
3. Cathode
4. No Connection
5. Gnd
6. Vout
7. V_B
8. V_{CC}

Features

- High current transfer ratio–2000% typical
- High isolation voltage between input and output (Viso=3750 Vrms)
- Guaranteed performance from 0 to 70°C
- Logic gate output
- Compliance with EU REACH
- Pb free and RoHS and Halogen free compliant.
- UL and cUL approved(No. E214129)
- VDE approved (No. 40028116)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

Description

The EL0700 and EL0701 devices each consists of an infrared emitting diode, optically coupled to a high gain split Darlington photo detector. They provide extremely high current transfer ratio between input and output, with access to a base terminal to adjust the gain bandwidth. These devices are packaged in to the standard SO-8 footprint.

Applications

- Digital logic ground isolation
- RS-232C line receiver
- Low input current line receiver
- Microprocessor bus isolation
- Current loop receiver

Copyright © 2010, Everlight All Rights Reserved. Release Date :April 22, 2015. Issue No: DPC-0000274 Rev.3

Absolute Maximum Ratings (Ta=25°C)

	Parameter		Symbol	Rating	Unit
Input	Forward current		I_F	20	mA
	Peak forward current (50% duty, 1ms P.W)		I_{FP}	40	mA
	Peak transient current (≤1μs P.W,300pps)		I_{Ftrans}	1	A
	Reverse voltage		V_R	5	V
	Power dissipation		P_{IN}	45	mW
Output	Power dissipation		P_O	100	mW
	Output current		IO	60	mA
	Emitter-Base Reverse Voltage		VER	0.5	V
	Output voltage	EL0700	V_O	-0.5 to 7	V
		EL0701		-0.5 to 18	
	Supply voltage	EL0700	V_{CC}	-0.5 to 7	V
		EL0701		-0.5 to 18	
Isolation voltage *1			V_{ISO}	3750	V rms
Operating temperature			T_{OPR}	-40 ~ +85	°C
Storage Temperature			T_{STG}	-55 ~ +125	°C
Soldering temperature *2			T_{SOL}	260	°C

Notes:

*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2, 3, 4 are shorted together, and pins 5, 6, 7, 8 are shorted together.

*2 For 10 seconds

Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

Electrical Characteristics (T_A=0 to 70°C unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	V_F	-	1.25	1.7	V	I_F = 1.6mA
Reverse Voltage	V_R	5.0	-	-	V	I_R = 10μA, T_A=25°C
Temperature coefficient of forward voltage	$\Delta V_F/\Delta T_A$	-	-1.8	-	mV/°C	I_F =1.6mA

Output

Parameter		Symbol	Min	Typ.	Max.	Unit	Condition
Logic High Output Current	EL0700	I_{OH}	-	0.01	100	μA	I_F=0mA, V_O=V_{CC}=18V
	EL0701		-	-	250		
Logic Low Supply Current	EL0700	I_{CCL}	-	0.5	1.5	mA	I_F=1.6mA, V_O=Open, V_{CC}=18V
	EL0701						
Logic High Supply Current	EL0700	I_{CCH}	-	0.05	10	μA	I_F=0mA, V_O=Open, V_{CC}=18V
	EL0701						

Transfer Characteristics (T_a=0 to 70°C unless specified otherwise, Vcc=4.5V)

Parameter		Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer Ratio	EL0701	CTR	400	2500	-	%	I_F = 0.5mA, V_O = 0.4V, V_{CC}=4.5V
			500	2000	-		I_F = 1.6mA, V_O = 0.4V, V_{CC}=4.5V
	EL0700		300	2000	-		
Logic Low Output Voltage	EL0701	V_{OL}	-	0.05	0.4	V	I_F = 0.5mA, I_O = 2mA, V_{CC}=4.5V
			-	0.1	0.4		I_F = 1.6mA, I_O = 8mA, V_{CC}=4.5V
			-	0.15	0.4		I_F = 5mA, I_O = 15mA, V_{CC}=4.5V
			-	0.18	0.4		I_F = 12mA, I_O = 24mA, V_{CC}=4.5V
	EL0700		-	0.08	0.4		I_F = 1.6mA, I_O = 4.8mA, V_{CC}=4.5V

Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

Switching Characteristics (T_a=0 to 70°C unless specified otherwise, Vcc=5V)

Parameter		Symbol	Min	Typ.	Max.	Unit	Condition
Propagation Delay Time to Logic Low (Fig. 13)	EL0701	TPHL	-	11	25	µs	I_F = 0.5mA , R_L=4.7kΩ, T_A=25°C
			-	-	30		I_F = 0.5mA , R_L=4.7kΩ
			-	0.5	1		I_F = 12mA , R_L=270Ω, T_A=25°C
			-	-	2		I_F = 12mA , R_L=270Ω
	EL0700		-	3	10		I_F = 1.6mA , R_L=2.2kΩ, T_A=25°C
			-	-	15		I_F = 1.6mA , R_L=2.2kΩ
Propagation Delay Time to Logic High (Fig. 13)	EL0701	TPLH	-	20	60	µs	I_F = 0.5mA , R_L=4.7kΩ, T_A=25°C
			-	-	90		I_F = 0.5mA , R_L=4.7kΩ
			-	2.5	7		I_F = 12mA , R_L=270Ω, T_A=25°C
			-	-	10		I_F = 12mA , R_L=270Ω
	EL0700		-	8	35		I_F = 1.6mA , R_L=2.2kΩ, T_A=25°C
			-	-	50		I_F = 1.6mA , R_L=2.2kΩ
Common Mode Transient Immunity at Logic High (Fig. 14) *3		CM_H	1,000	-	-	V/µs	I_F = 0mA , V_{CM}=10Vp-p, R_L=2.2KΩ, T_A=25°C
Common Mode Transient Immunity at Logic Low (Fig. 14) *3		CM_L	1,000	-	-	V/µs	I_F = 1.6mA , V_{CM}=10Vp-p, R_L=2.2KΩ, T_A=25°C

* Typical values at T_a = 25°C

Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

Typical Electro-Optical Characteristics Curves

Figure 1. LED Forward Current vs Forward Voltage

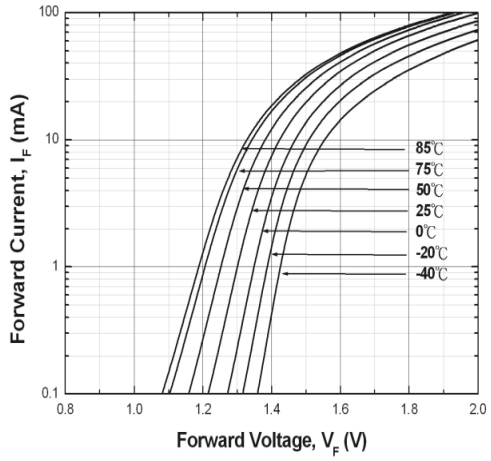


Figure 2. LED Forward Voitage vs Temperature

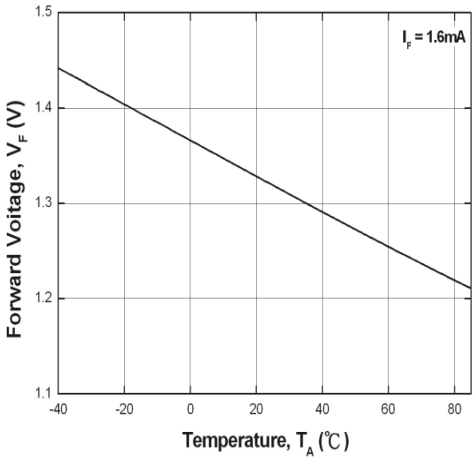


Figure 3. Output Current vs Output Voltage

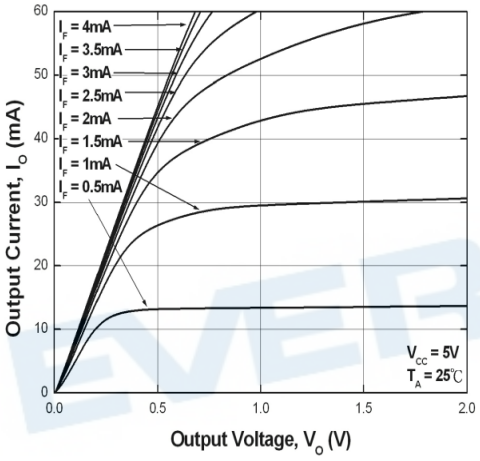


Figure 4. Output Current vs Input Diode Forward Current

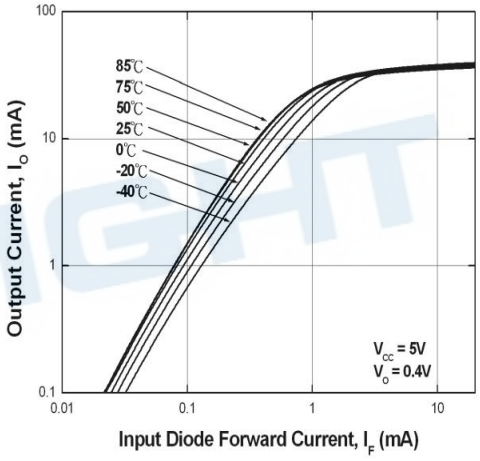


Figure 5. Current Transfer Ratio vs Forward Current

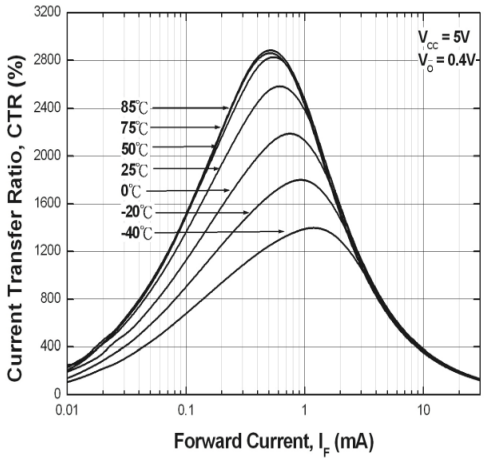
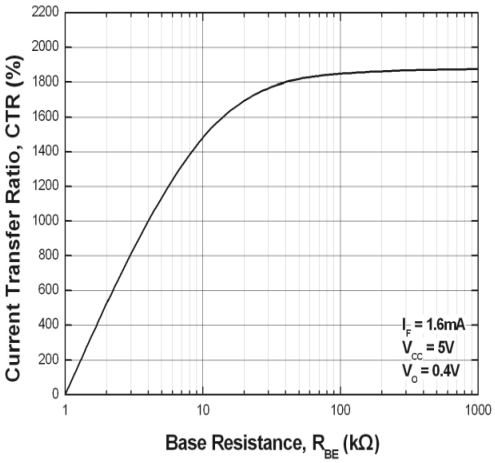


Figure 6. Current Transfer Ratio vs Base-Emitter Resistance



Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

Figure 7. Non-saturated Rise nand Fall Times vs Load Resistance

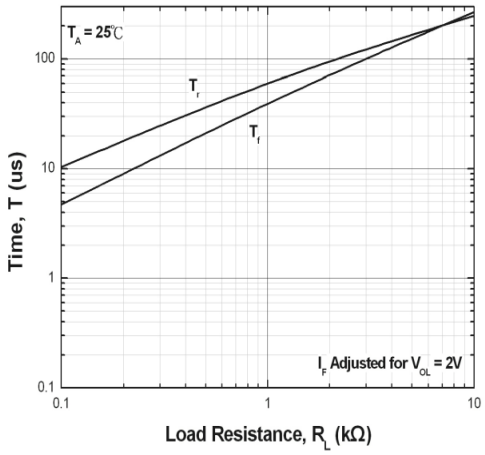


Figure 8. Propagation Delay To Logic Low vs Base-Emitter Resistance

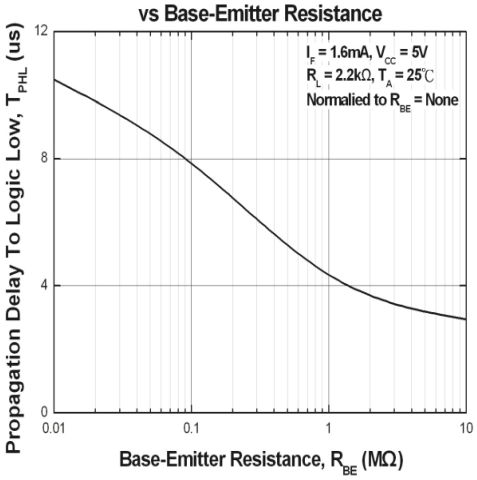


Figure 9. Propagation Deley vs Input Diode Forward Current

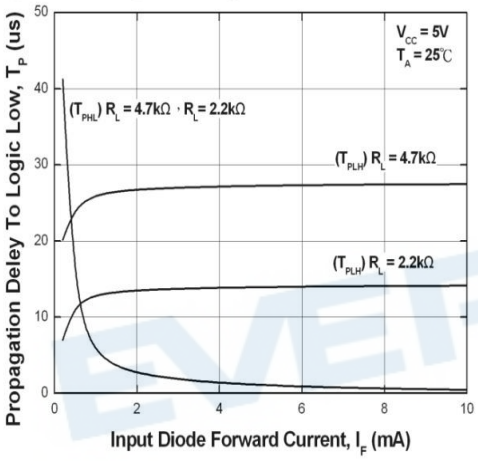


Figure 10. Propagation Deley To Logic Low vs Pulse Period

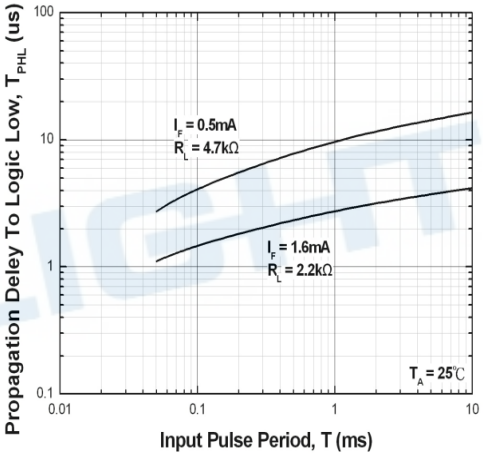


Figure 11. Propagation Deley vs Temperature

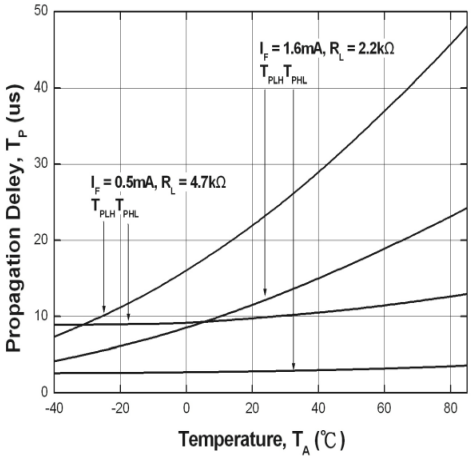
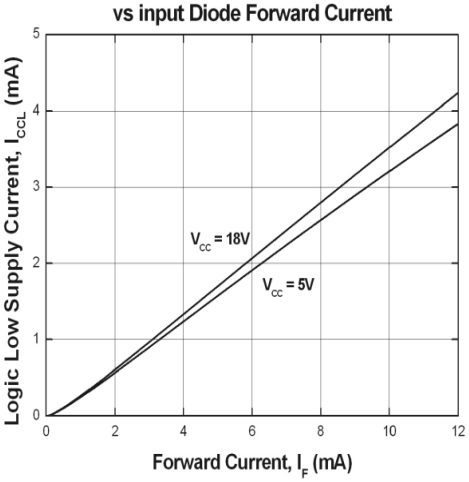


Figure 12. Logic Low Supply Current vs input Diode Forward Current



Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

Fig. 13 Switching Time Test Circuit and Waveform

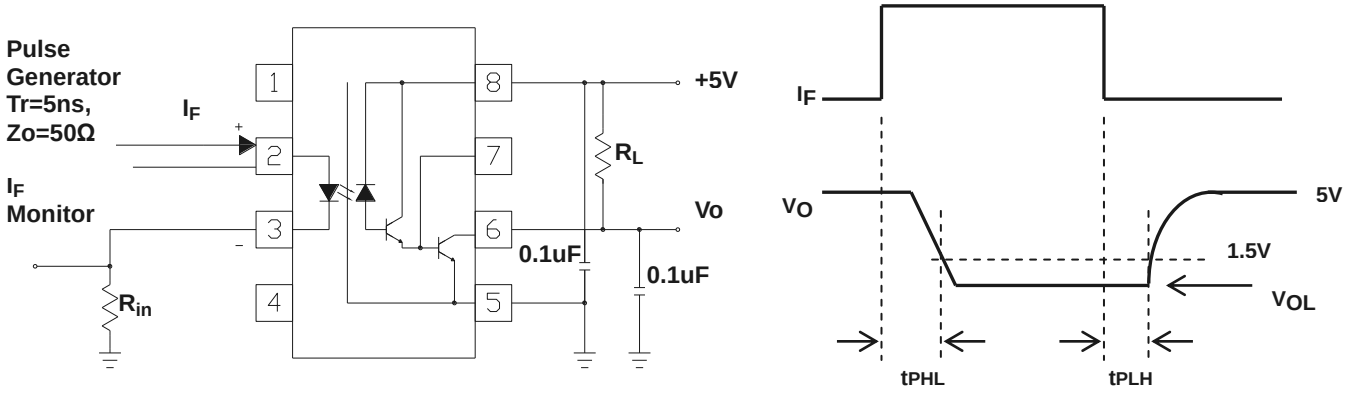
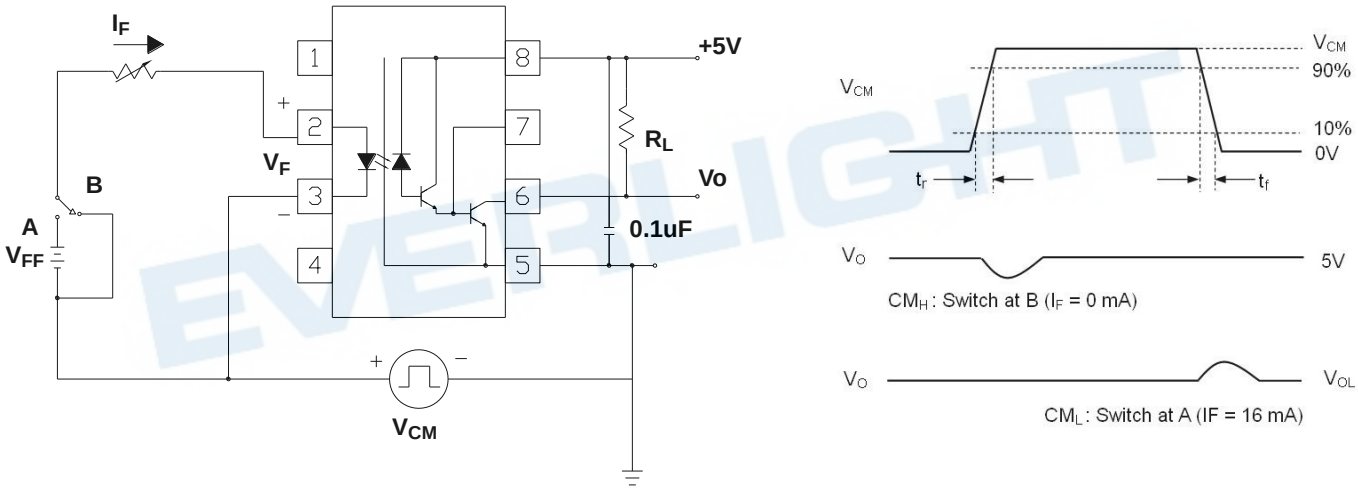


Fig. 14 Common Mode Transient Immunity Test Circuit and Waveform



Note:

*3 Common mode transient immunity in logic high level is the maximum tolerable (positive) dVcm/dt on the leading edge of the common mode pulse signal VCM, to assure that the output will remain in a logic high state (i.e., VO > 2.0V).

Common mode transient immunity in logic low level is the maximum tolerable (negative) dVcm/dt on the trailing edge of the common mode pulse signal, VCM, to assure that the output will remain in a logic low state (i.e., VO < 0.8V).

Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

Order Information

Part Number

EL070X(Z)-VG

Note

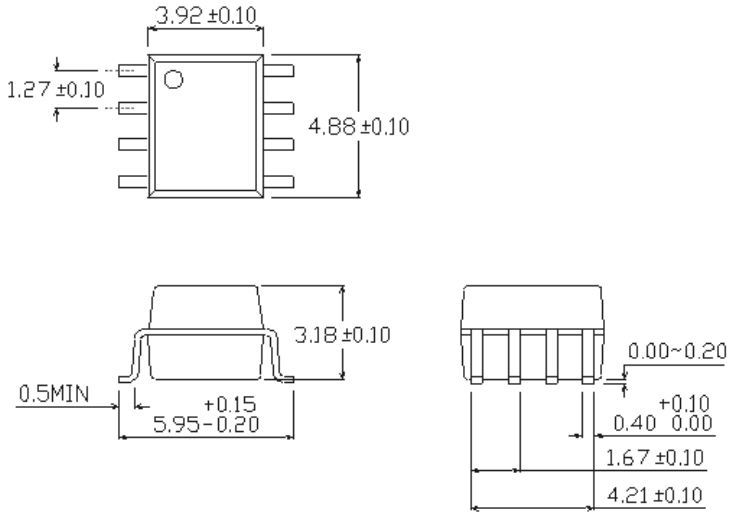
X = Part No. (X = 0 or 1)
Z = Tape and reel option (TA, TB or none).
V = VDE
G = Halogens free

Option	Description	Packing quantity
None	Standard	100 units per tube
-V	Standard + VDE	100 units per tube
(TA)	TA tape & reel option	2000 units per reel
(TB)	TB tape & reel option	2000 units per reel
(TA)-V	TA tape & reel option + VDE	2000 units per reel
(TB)-V	TB tape & reel option + VDE	2000 units per reel

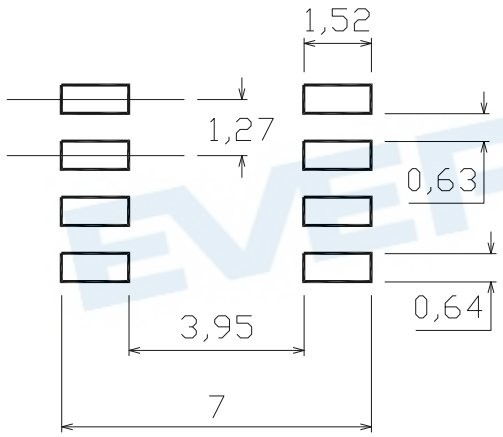
EVERLIGHT

Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

Package Dimension
(Dimensions in mm)



Recommended pad layout for surface mount leadform



Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

Device Marking



Notes

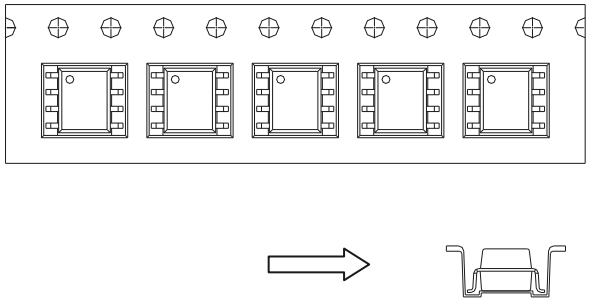
EL	denotes EVERLIGHT
0700	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE

EVERLIGHT

Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

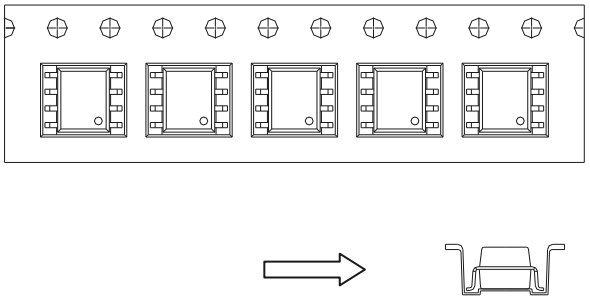
Tape & Reel Packing Specifications

Option TA



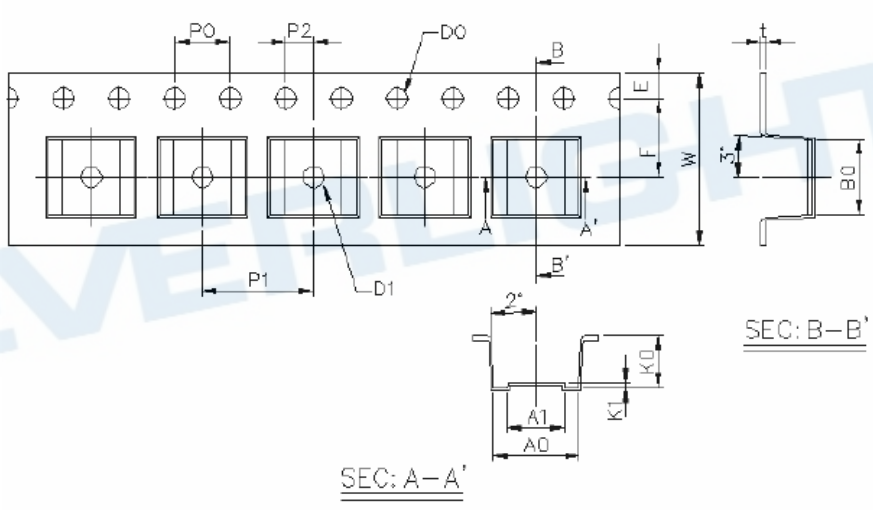
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions



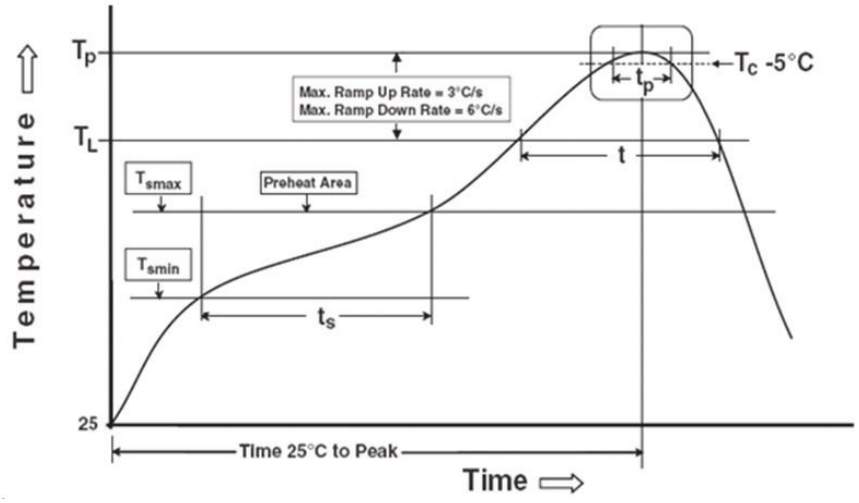
Dimension No.	**A0**	**B0**	**D0**	**D1**	**E**	**F**
Dimension(mm)	6.2±0.1	5.26±0.1	1.5±0.1	1.5±0.25	1.75±0.1	5.5±0.05
Dimension No.	**Po**	**P1**	**P2**	**t**	**W**	**K0**
Dimension(mm)	4.0±0.1	8.0±0.1	2.0±0.1	0.25±0.02	12.0+0.3/ -0.1	3.75±0.1

Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

Precautions for Use

1. Soldering Condition

1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile



Note: Reference: IPC/JEDEC J-STD-020D

Preheat	
Temperature min (T_{smin})	150 °C
Temperature max (T_{smax})	200°C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max
Other	
Liquidus Temperature (T_L)	217 °C
Time above Liquidus Temperature (t_L)	60-100 sec
Peak Temperature (T_P)	260°C
Time within 5 °C of Actual Peak Temperature: T_P - 5°C	30 s
Ramp- Down Rate from Peak Temperature	6°C /second max.
Time 25°C to peak temperature	8 minutes max.
Reflow times	3 times

.

Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3

DISCLAIMER

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
2. When using this product, please observe the absolute maximum ratings and the instructions for using outlined in these specification sheets. EVERLIGHT assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets.
3. These specification sheets include materials protected under copyright of EVERLIGHT corporation. Please don't reproduce or cause anyone to reproduce them without EVERLIGHT's consent.

EVERLIGHT

Copyright © 2010, Everlight All Rights Reserved. Release Date : April 22, 2015. Issue No: DPC-0000274 Rev.3