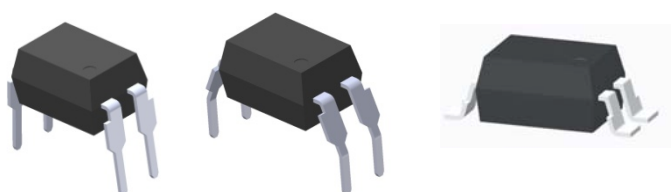
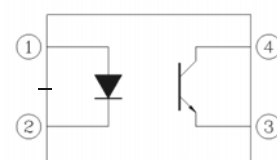


4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER EL816 Series



Schematic



Pin Configuration

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

Features:

- Compliance Halogens Free (Only copper leadframe)
(Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- Current transfer ratio
(CTR: 50~600% at $I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$)
(CTR: 63~320% at $I_F = 10\text{mA}$, $V_{CE} = 5\text{V}$)
- High isolation voltage between input and output ($V_{iso}=5000\text{Vrms}$)
- Creepage distance > 7.62mm
- Operating temperature up to +110°C
- Compact small outline package
- Pb free
- The product itself will remain within RoHS compliant version
- Compliance with EU REACH
- UL and cUL approved(No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

Description

The EL816 Series of devices each consist of an infrared emitting diodes, optically coupled to a phototransistor detector. They are packaged in a 4-pin DIP package and available in wide-lead spacing and SMD option.

Applications

- Programmable controllers
- System appliances, measuring instruments
- Telecommunication equipments
- Home appliances, such as fan heaters, etc.
- Signal transmission between circuits of different potentials and impedances

Absolute Maximum Ratings (Ta=25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I _F	60	mA
	Peak forward current (1us, pulse)	I _{FP}	1	A
	Reverse voltage	V _R	6	V
	Power Dissipation No derating required up to T _a = 100°C	P _D	100	mW
Output	Power dissipation Derating factor (above T _a = 80°C)	P _C	150 5.8	mW mW/°C
	Collector current	I _C	50	mA
	Collector-Emitter voltage	V _{CEO}	80	V
	Emitter-Collector voltage	V _{ECO}	6	V
	Total Power Dissipation	P _{TOT}	200	mW
	Isolation Voltage*1	V _{ISO}	5000	Vrms
	Operating Temperature	T _{OPR}	-55 to 110	°C
	Storage Temperature	T _{STG}	-55 to 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 are shorted together, and pins 3, 4 are shorted together.

*2 For 10 seconds

Electro-Optical Characteristics (Ta=25°C unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V_F	-	1.2	1.4	V	$I_F = 20\text{mA}$
Reverse Current	I_R	-	-	10	μA	$V_R = 4\text{V}$
Input capacitance	C_{in}	-	30	250	pF	$V = 0, f = 1\text{kHz}$

Note: Reverse Voltage(V_R) Condition is applied to I_R test only The device is not designed for reverse operation

Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Emitter dark current	I_{CEO}	-	-	100	nA	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$
Collector-Emitter breakdown voltage	BV_{CEO}	80	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	BV_{ECO}	6	-	-	V	$I_E = 0.1\text{mA}$

Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	EL816	50	-	600	%	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$
	EL816A	80	-	160		
	EL816B	130	-	260		
	EL816C	200	-	400		
	EL816D	300	-	600		
	EL816X	100	-	200		
	EL816Y	150	-	300		
	EL816I	63	-	125	%	$I_F = 10\text{mA}, V_{CE} = 5\text{V}$
	EL816J	100	-	200		
	EL816K	160	-	320		
	EL816I	22	-	-		
	EL816J	34	-	-		
	EL816K	56	-	-		

Transfer Characteristics ($T_a=25^{\circ}\text{C}$ unless specified otherwise) Continuity

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Emitter saturation voltage	$V_{CE(sat)}$	-	0.1	0.2	V	$I_F = 20\text{mA}, I_C = 1\text{mA}$
Isolation resistance	R_{IO}	5×10^{10}	-	-	Ω	$V_{IO} = 500\text{Vdc}$, 40~60% R.H.
Floating capacitance	C_{IO}	-	0.6	1.0	pF	$V_{IO} = 0$, $f = 1\text{MHz}$
Cut-off frequency	f_c	-	80	-	kHz	$V_{CE} = 5\text{V}$, $I_C = 2\text{mA}$ $R_L = 100\Omega$, -3dB
Rise time	t_r	-	-	18	μs	$V_{CE} = 2\text{V}$, $I_C = 2\text{mA}$, $R_L = 100\Omega$
Fall time	t_f	-	-	18	μs	

* Typical values at $T_a = 25^{\circ}\text{C}$

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Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

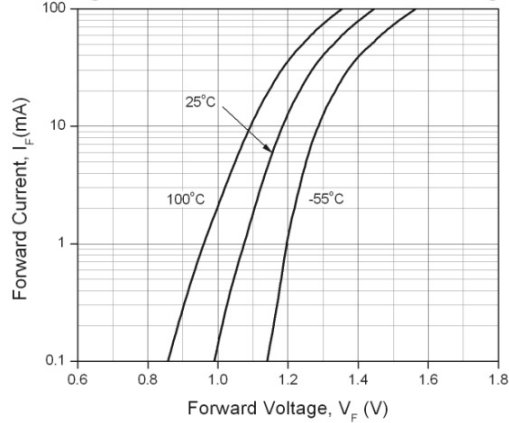


Figure 2. Normalized Collector Current vs Forward Current

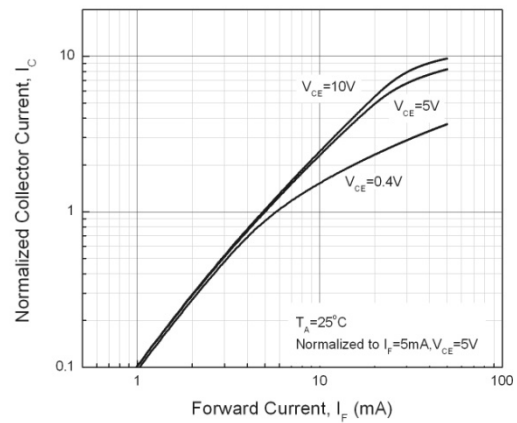


Figure 3. Normalized Current Transfer Ratio vs Forward Current

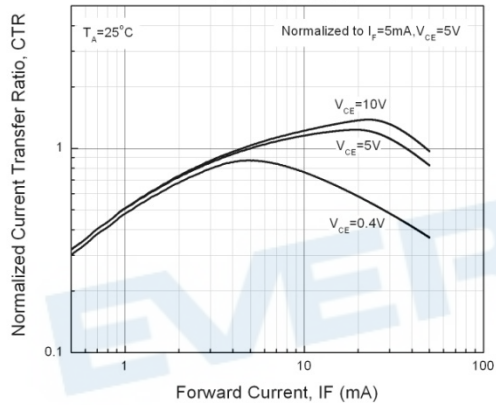


Figure 4. Normalized Collector Current vs Ambient Temperature

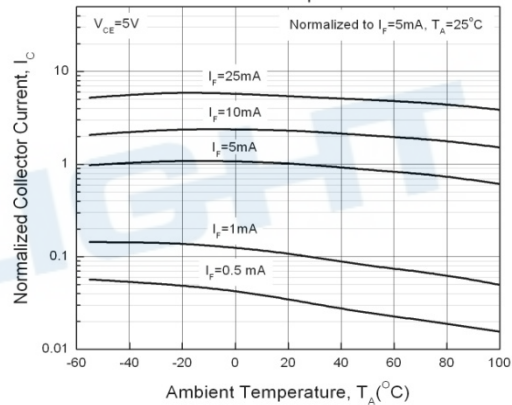


Figure 5. Collector Current vs Collector-Emitter Voltage

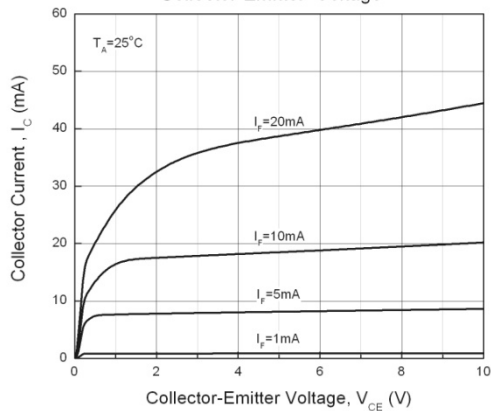


Figure 6. Collector Current vs Collector-Emitter Voltage

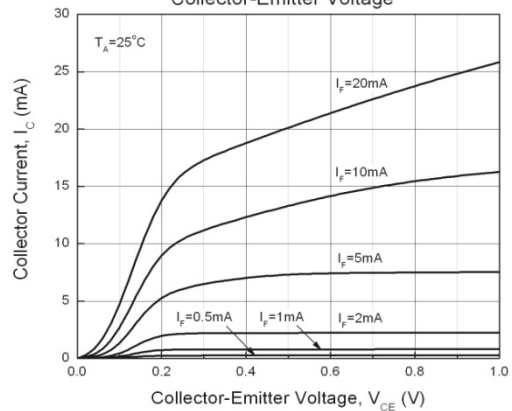


Figure 7. Collector Dark Current vs Ambient Temperature

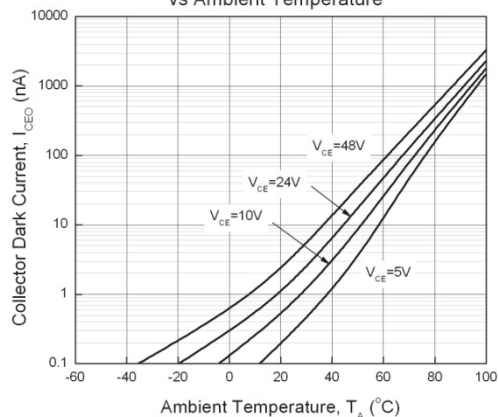


Figure 8. Switching Time vs Load Resistance

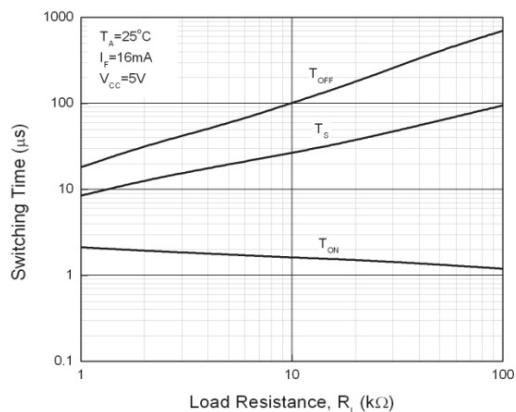


Figure 9. Collector-Emitter Saturation Voltage vs Ambient Temperature

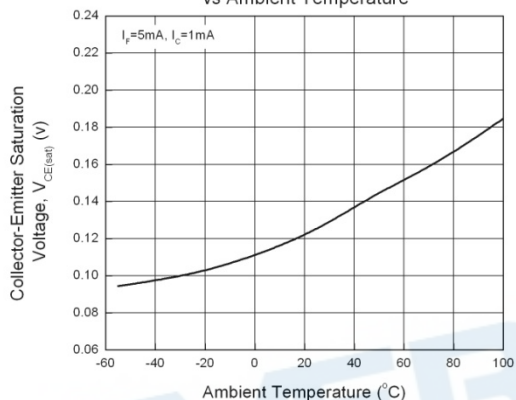
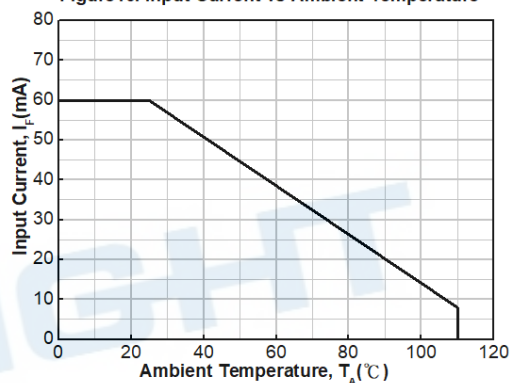


Figure 10. Input Current vs Ambient Temperature



Note: The graphs shown in this datasheet are representing typical data only and do not show guaranteed values

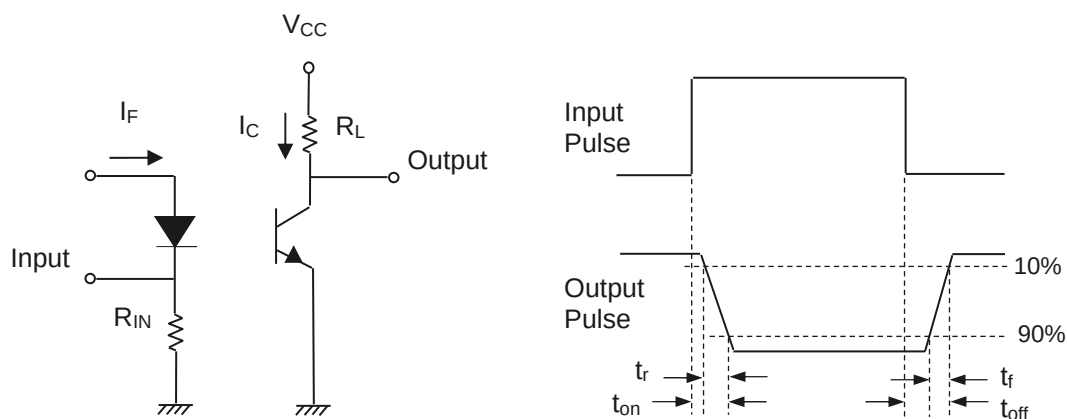


Figure 11. Switching Time Test Circuit & Waveforms

Order Information

Part Number

EL816X(Y)(Z)-FV

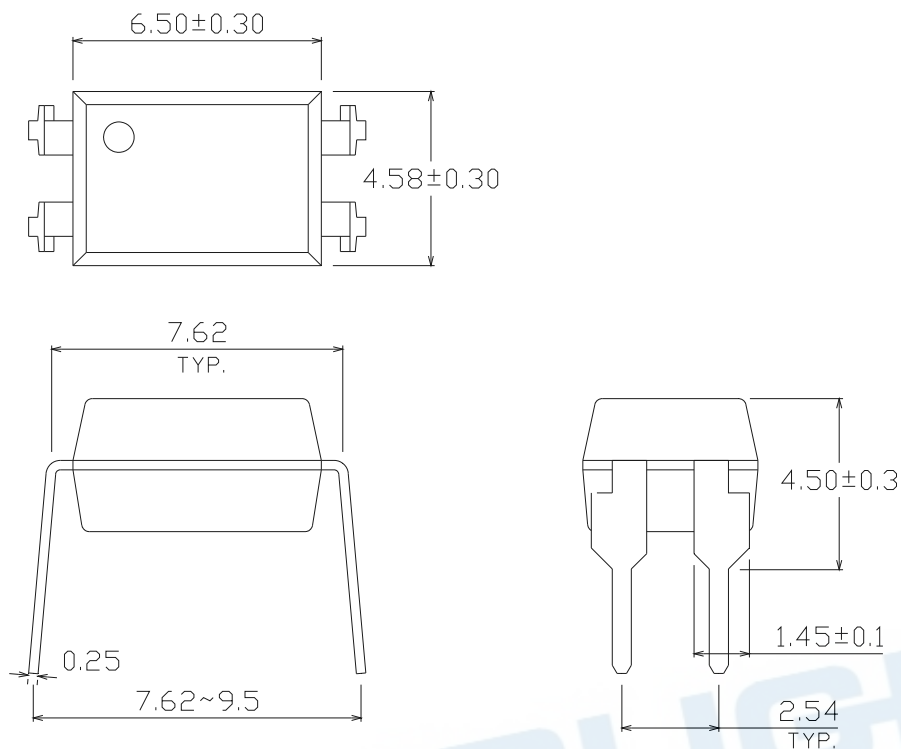
Note

- X = Lead form option (S1, S2, M or none)
Y = CTR Rank (A, B, C, D, X, Y, I, J, K or none)
Z = Tape and reel option (TU, TD or none).
F = Lead frame option (F: Iron, None: copper)
V = VDE safety (optional).

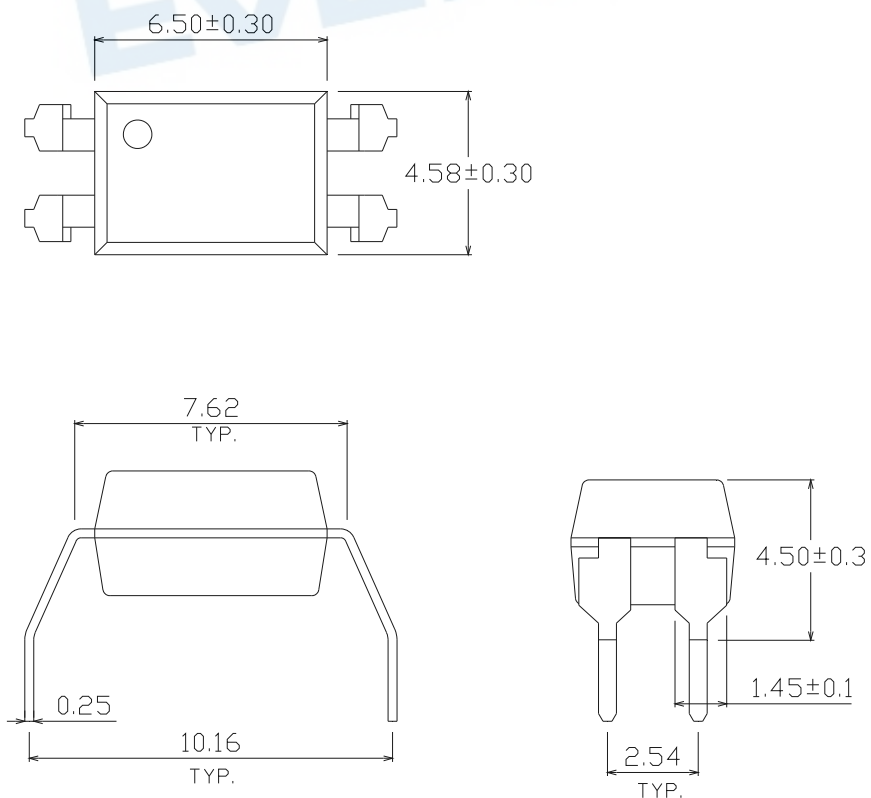
Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S1 (TU)	Surface mount lead form (low profile) + TU tape & reel option	2000 units per reel
S1 (TD)	Surface mount lead form (low profile) + TD tape & reel option	2000 units per reel
S2 (TU)	Surface mount lead form (low profile) + TU tape & reel option	2000 units per reel
S2 (TD)	Surface mount lead form (low profile) + TD tape & reel option	2000 units per reel

Package Dimension (Dimensions in mm)

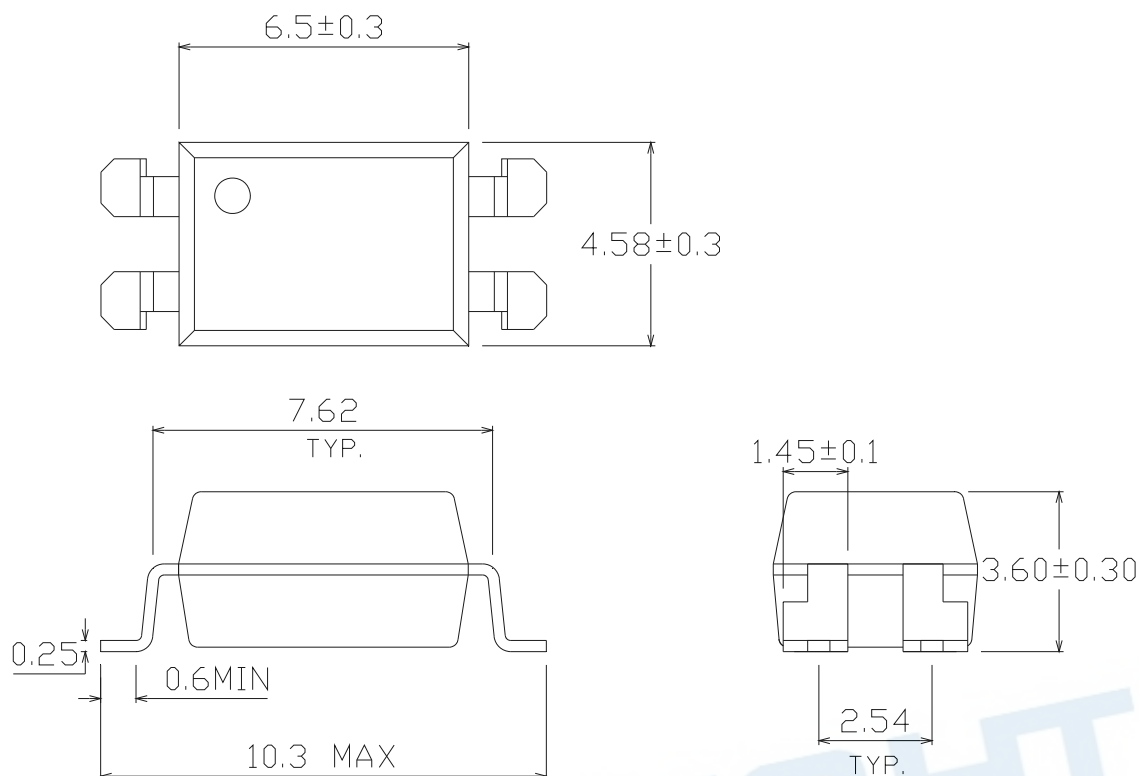
Standard DIP Type



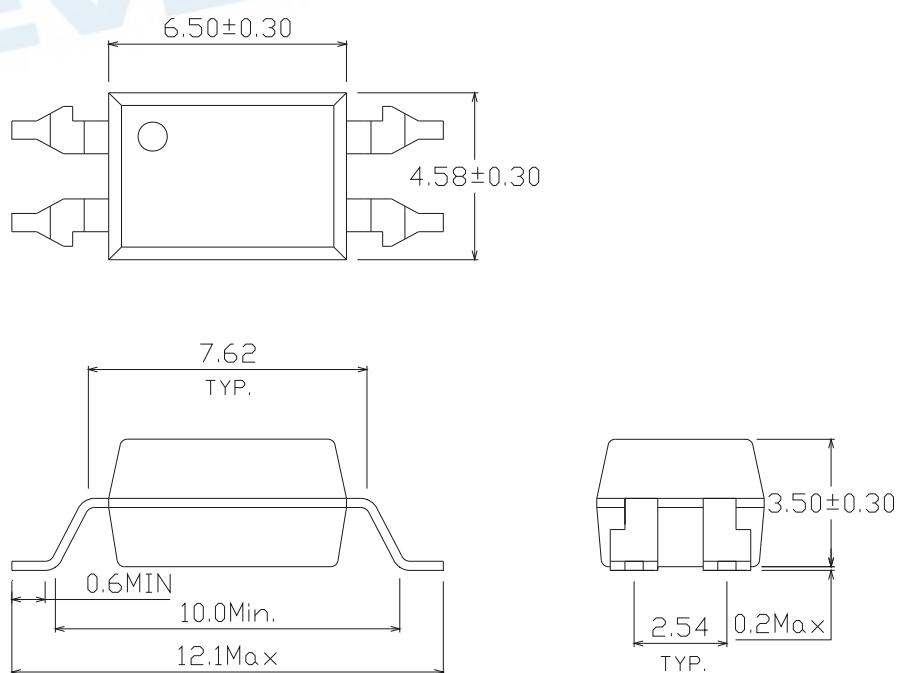
Option M Type



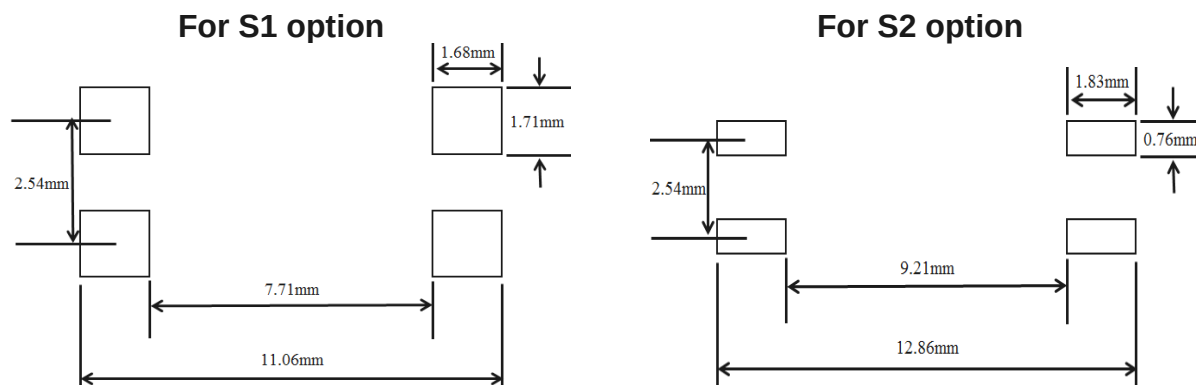
Option S1 Type



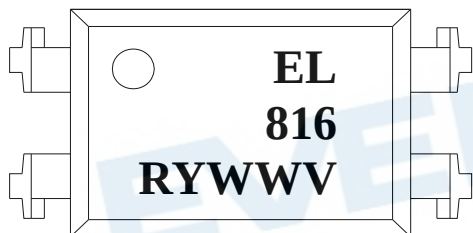
Option S2 Type



Recommended pad layout for surface mount leadform



Device Marking



Notes

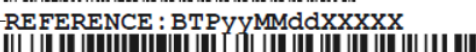
- EL denotes EVERLIGHT
- 816 denotes Device Number
- R denotes CTR Rank(A, B, C, D, X, Y, I, J, K or none)
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE (optional)

Label form

 **EVERLIGHT** 11 → 月份
 客戶料號 ← CPN: XXXXXXXXXXXX 測試區
 億光料號 ← P/N: XXXXXXXXXXXX

 億光品名 ← EL817M(C)-VG

 生產周別 ← D/C: YWWX CAT: X QTY: 000000
 REF: XXXX  → 包裝數量
 生產序號 ← LOT NO: Y151130XXXXXXXXXX

 標籤識別碼 ← REFERENCE: BTPyyMMddXXXXX

 產地 ← MADE IN XXXXXX  → QR Code

or

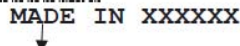
RoHS 標示
 **EVERLIGHT** 5 → 月份
 客戶料號 ← CPN: XXXXXXXXXXXX 測試區

 客戶品名 ← XXXXXXXXXXX-XXXXXXXXXX-XXXXXXXXXX-XXXXXXXXXX-XXXXXX
 億光料號 ← P/N: XXXXXXXXXXXX

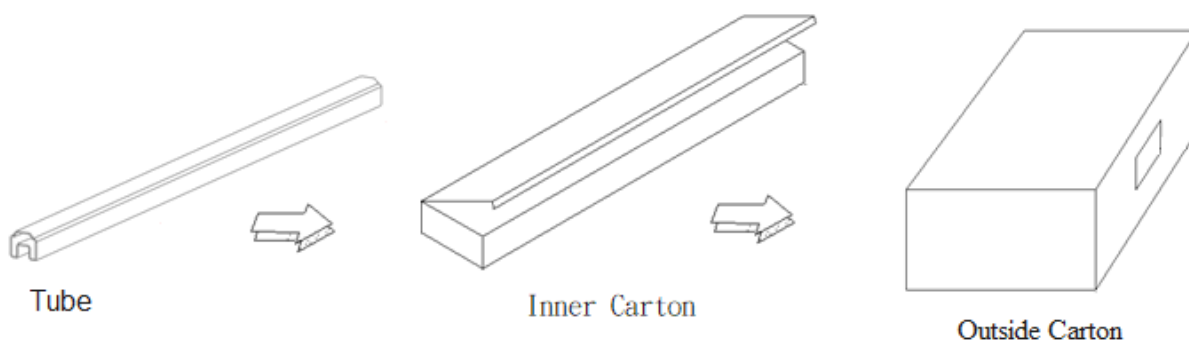
 億光品名 ← XXXXXXXXXXX-XXXXXXXXXX-XXXXXXXXXX-XXXXXX
 生產序號 ← LOT NO: Y150516XXX-XXXXXXXXXX-XXXXXXXXXX

 包裝數量 ← QTY: 0123456789 HUE: XXXXXXXXXXXX
 
 CTR等級 ← CAT: XXXXXXXXXXXX REF: XXXXXXXXXXXX

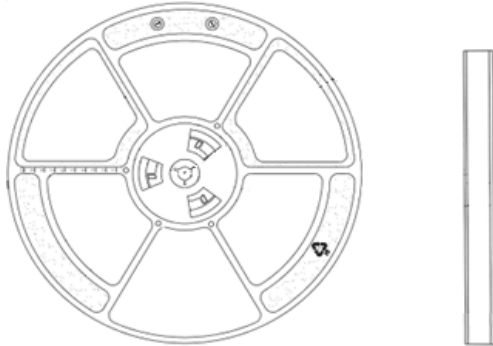
 標籤識別碼 ← REFERENCE: BTPYYMMDDXXXXX

 MSL等級 ← MSL-XX MADE IN XXXXXX

 產地
 → QR Code

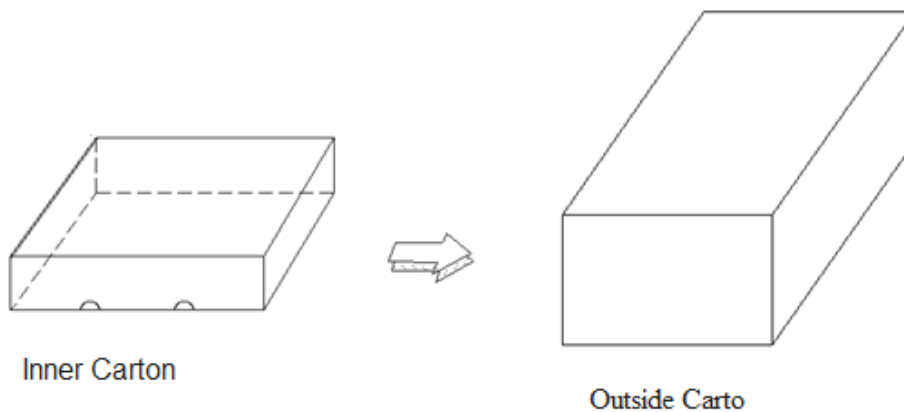
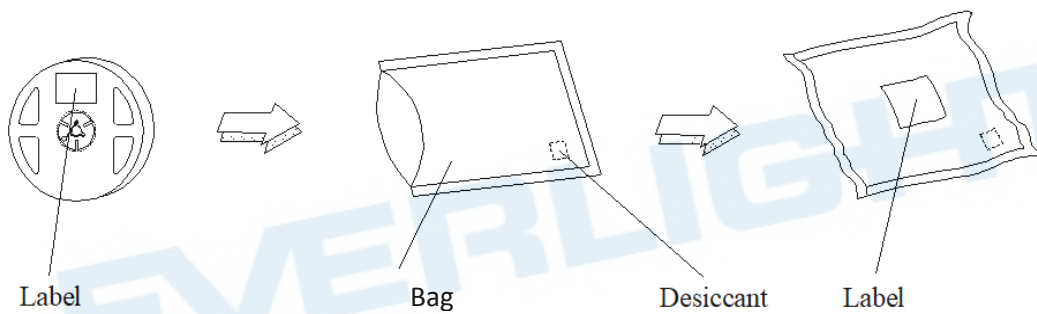
TUBE Dimension



Reel Dimension

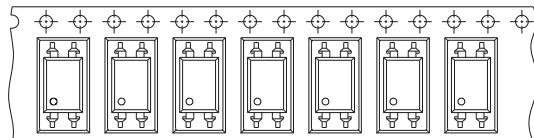


Moisture Resistant Packaging

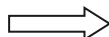


Tape & Reel Packing Specifications

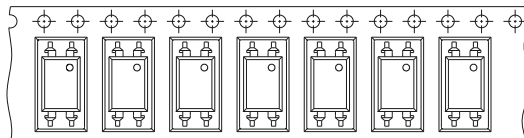
Option TD



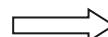
Direction of feed from reel



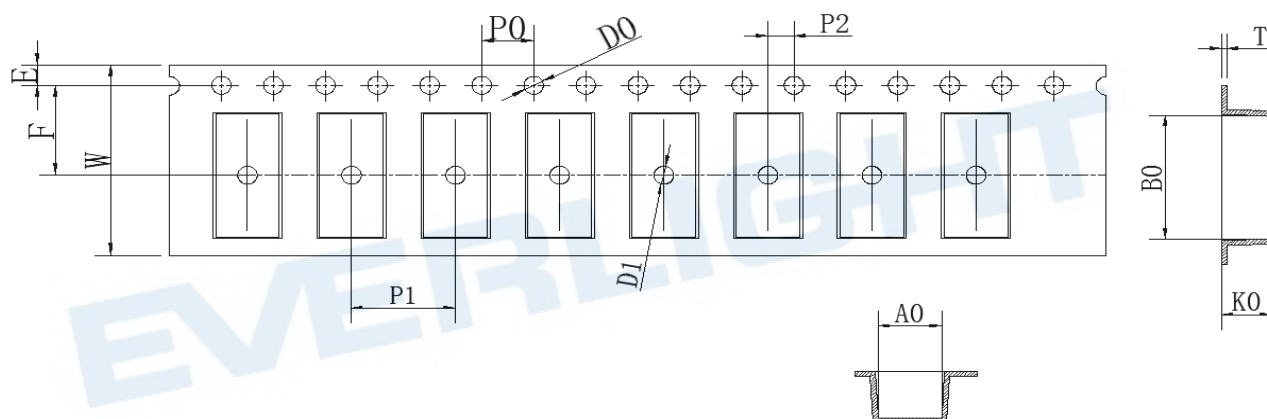
Option TU



Direction of feed from reel



Tape dimensions

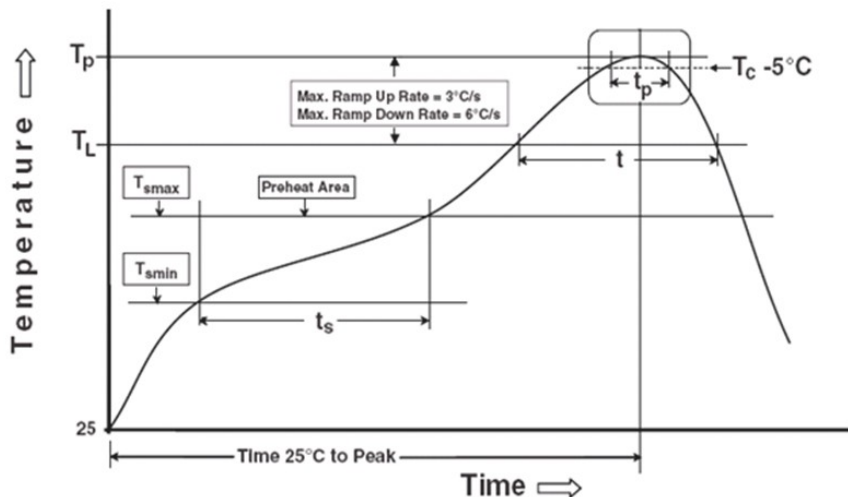


Dimension No.	Ao	Bo	Do	D1	E	F
Dimension (mm) S1	4.90±0.1	10.40±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.50±0.1
Dimension (mm) S2	4.88±0.1	12.55±0.1	1.5±0.1	1.50±0.1	1.75±0.1	11.5±0.1
Dimension No.	Po	P1	P2	t	W	Ko
Dimension (mm) S1	4.00±0.1	8.00±0.1	2.00±0.1	0.40±0.1	16.00±0.3	4.00±0.1
Dimension (mm) S2	4.00±0.1	8.00±0.1	2.00±0.1	0.40±0.1	24.00±0.3	4.00±0.1

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: $T_P - 5^\circ\text{C}$	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

Precautions for General Storage

- Avoid storage locations where devices may be exposed to moisture or direct sunlight.
- Follow the precautions printed on the packing label of the device for transportation and storage.
- Keep the storage location temperature and humidity within a range of 5°C to 35°C and 20 % to 60 %, respectively.
- Do not store the products in locations with poisonous gases (especially corrosive gases) or in dusty conditions.
- Store the products in locations with minimal temperature fluctuations. Rapid temperature changes during storage can cause condensation, resulting in lead oxidation or corrosion, which will deteriorate the solderability of the leads.
- When restoring devices after removal from their packing, use anti-static containers.
- Do not allow loads to be applied directly to devices while they are in storage.
- If devices have been stored for more than two years under normal storage conditions, it is recommended that you check the leads for ease of soldering prior to use.

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DISCLAIMER

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
2. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
3. When using this product, please observe the absolute maximum ratings and the instructions for use 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.
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