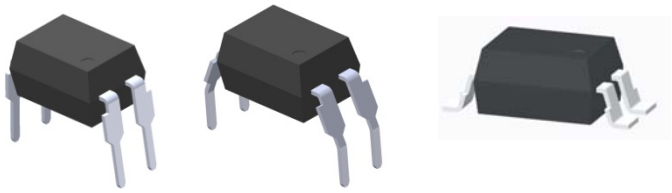
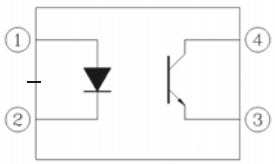
DATASHEET

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 = 5mA, V_{CE} = 5V)
  (CTR: 63~320% at I_F = 10mA, V_{CE} = 5V)
- High isolation voltage between input and output (Viso=5000Vrms)
- 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	P_C	150	mW
	Derating factor (above T_a = 80°C)		5.8	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 = 20mA
Reverse Current	I_R	-	-	10	μA	V_R = 4V
Input capacitance	C_{in}	-	30	250	pF	V = 0, f = 1kHz

Note: Reverse Voltage(VR) Condition is applied to IR 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} = 20V, I_F = 0mA
Collector-Emitter breakdown voltage	BV_{CEO}	80	-	-	V	I_C = 0.1mA
Emitter-Collector breakdown voltage	BV_{ECO}	6	-	-	V	I_E = 0.1mA

Transfer Characteristics

Parameter		Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	EL816	CTR	50	-	600	%	I_F = 5mA ,V_{CE} = 5V
	EL816A		80	-	160		
	EL816B		130	-	260		
	EL816C		200	-	400		
	EL816D		300	-	600		
	EL816X		100	-	200		
	EL816Y		150	-	300		
	EL816I	CTR	63	-	125	%	I_F = 10mA ,V_{CE} = 5V
	EL816J		100	-	200		
	EL816K		160	-	320		
	EL816I		22	-	-		I_F = 1mA ,V_{CE} = 5V
	EL816J		34	-	-		
	EL816K		56	-	-		

Transfer Characteristics (T_a=25°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 = 20mA ,I_C = 1mA
Isolation resistance	R_{IO}	5×10^{10}	-	-	Ω	V_{IO} = 500Vdc, 40~60% R.H.
Floating capacitance	C_{IO}	-	0.6	1.0	pF	V_{IO} = 0, f = 1MHz
Cut-off frequency	fc	-	80	-	kHz	V_{CE} = 5V, I_C = 2mA R_L = 100Ω, -3dB
Rise time	t_r	-	-	18	μs	V_{CE} = 2V, I_C = 2mA, R_L = 100Ω
Fall time	t_f	-	-	18	μs	

* Typical values at T_a = 25°C

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

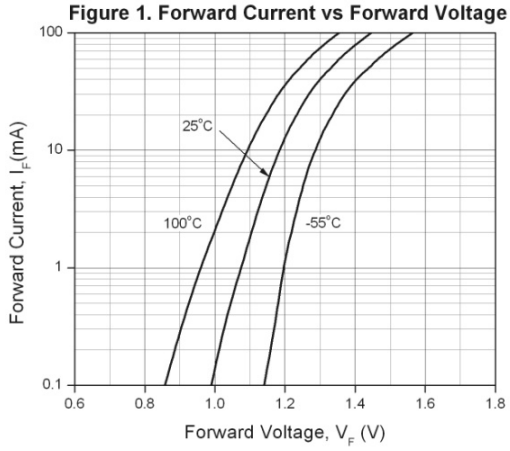


Figure 2. Normalized Collector Current vs Forward Current

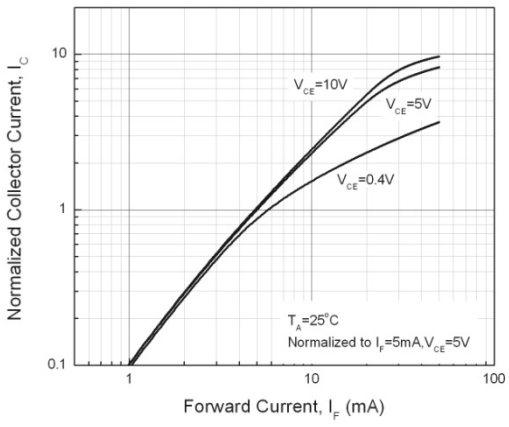


Figure 3. Normalized Current Transfer Ratio vs Forward Current

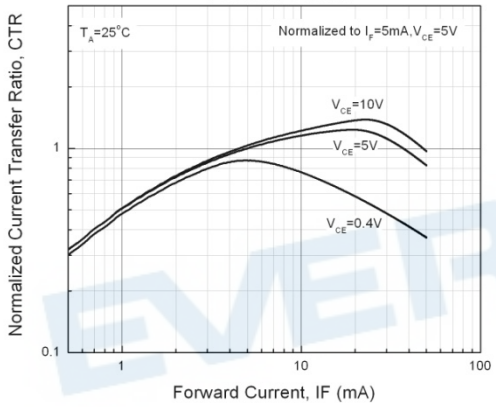


Figure 4. Normalized Collector Current vs Ambient Temperature

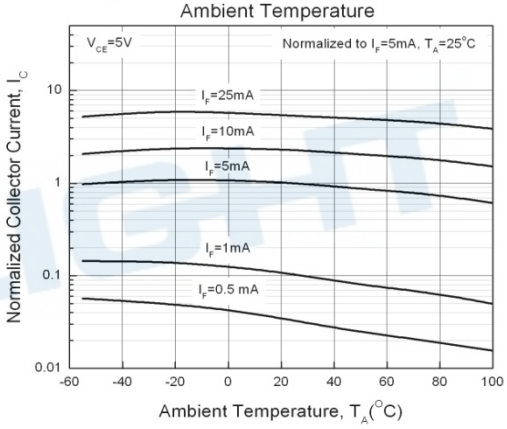


Figure 5. Collector Current vs Collector-Emitter Voltage

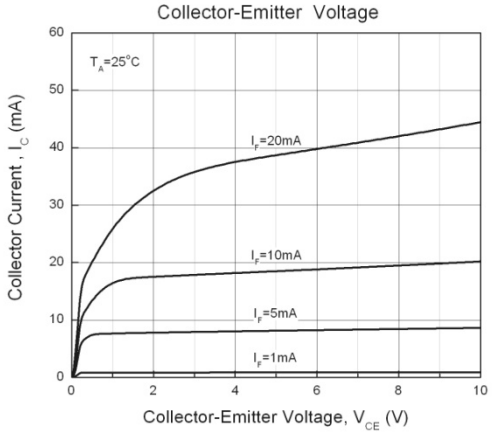


Figure 6. Collector Current vs Collector-Emitter Voltage

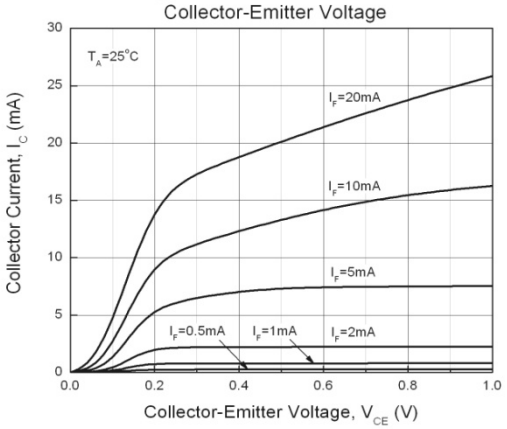


Figure 7. Collector Dark Current vs Ambient Temperature

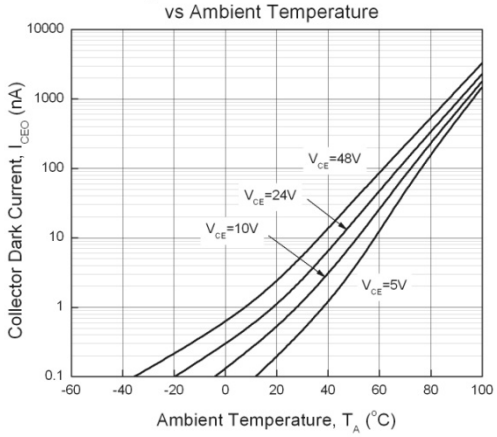


Figure 8. Switching Time vs Load Resistance

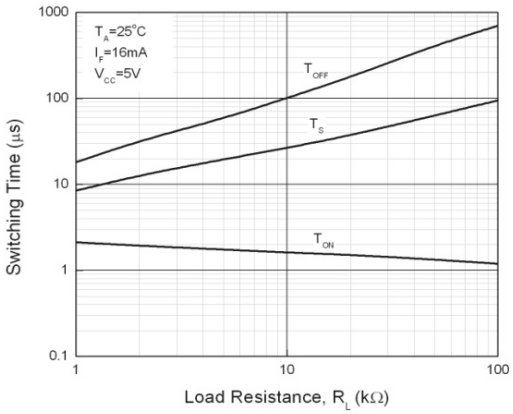


Figure 9. Collector-Emitter Saturation Voltage vs Ambient Temperature

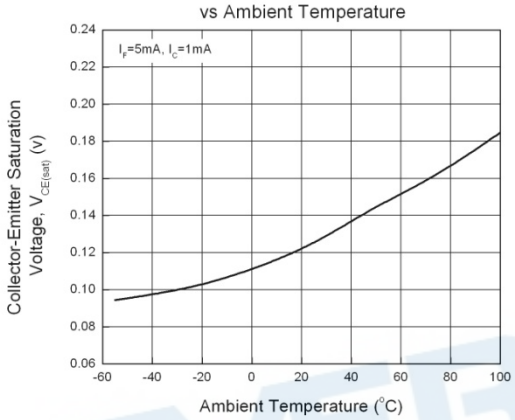
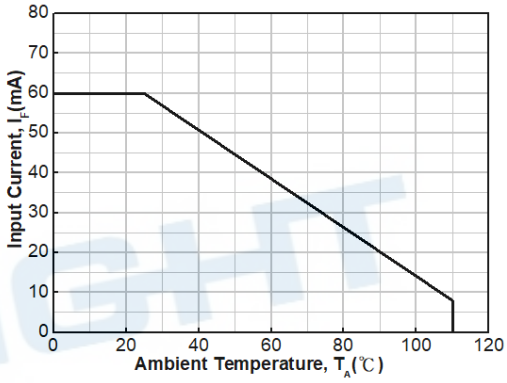


Figure10. Input Current vs Ambient Temperature



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

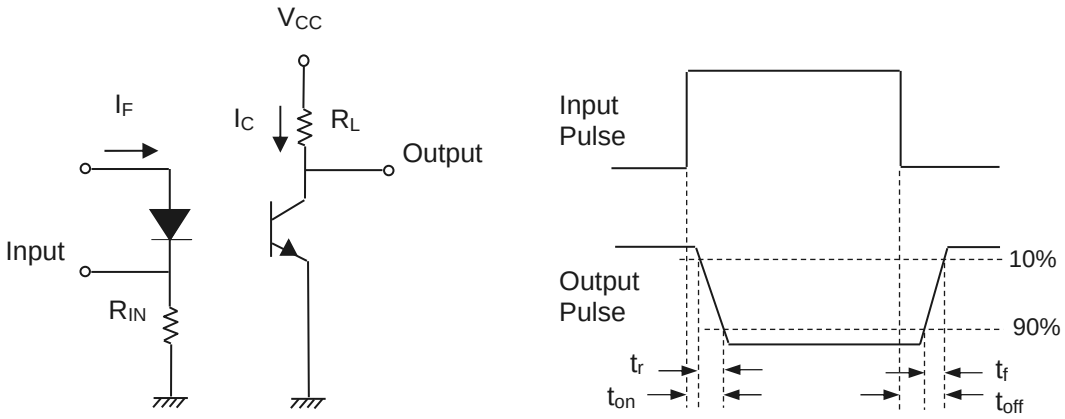


Figure 11. Switching Time Test Circuit & Waveforms

Order Information

Part Number

EL816X(Y)(Z)-FV

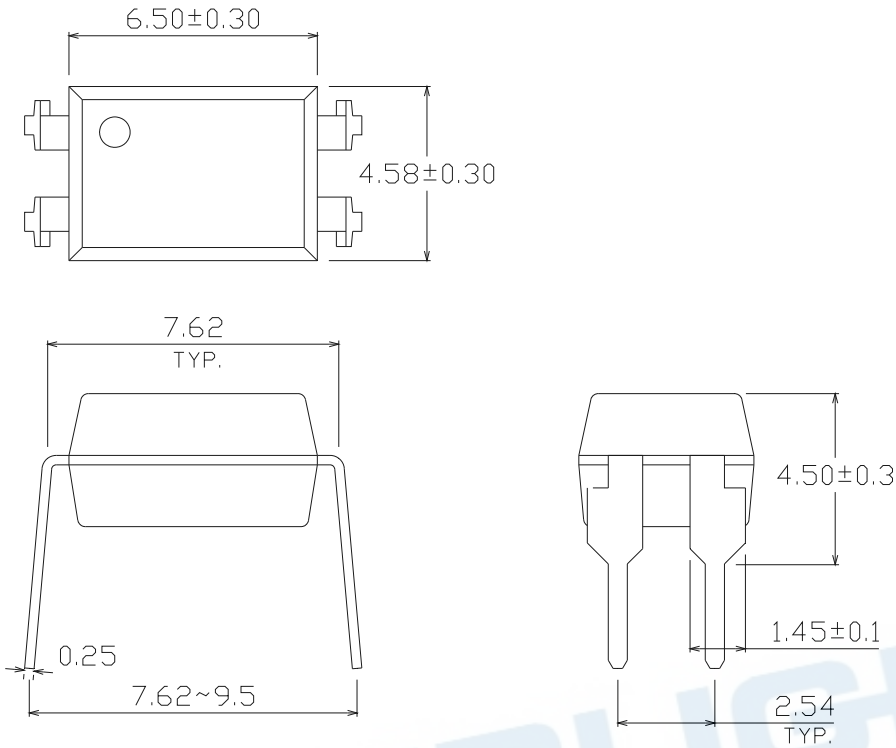
Note

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).

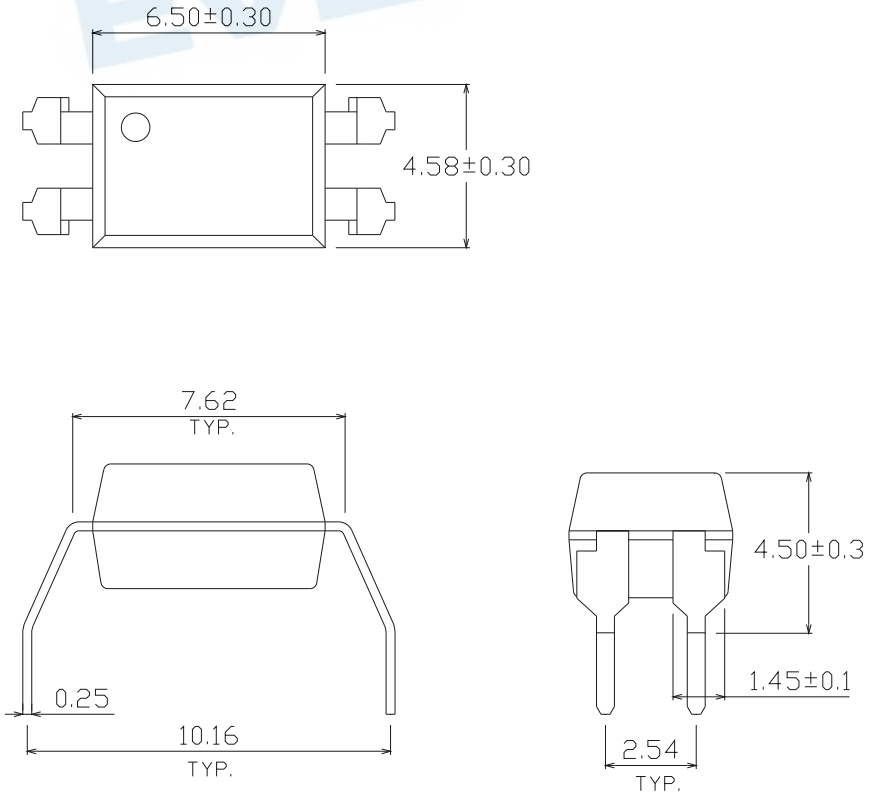
Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S1 (TU)	Surface mount lead form (low profile) + TU tape & reel option	2000 units per reel
S1 (TD)	Surface mount lead form (low profile) + TD tape & reel option	2000 units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

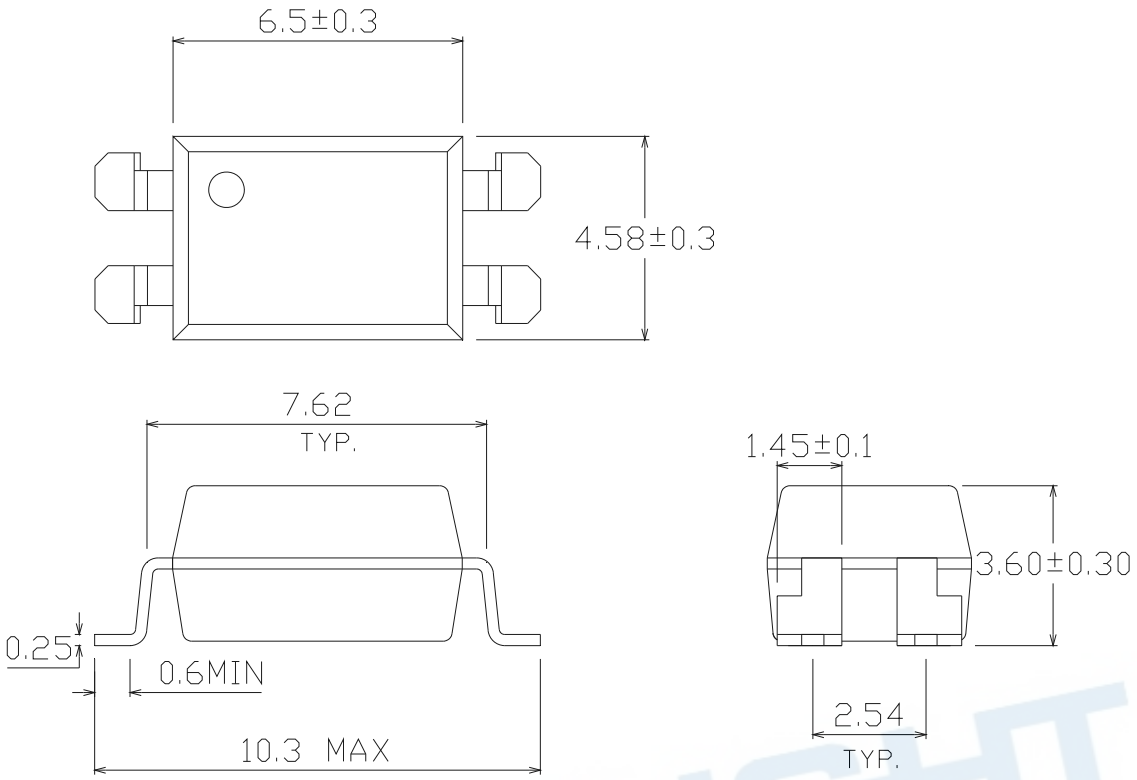
Standard DIP Type



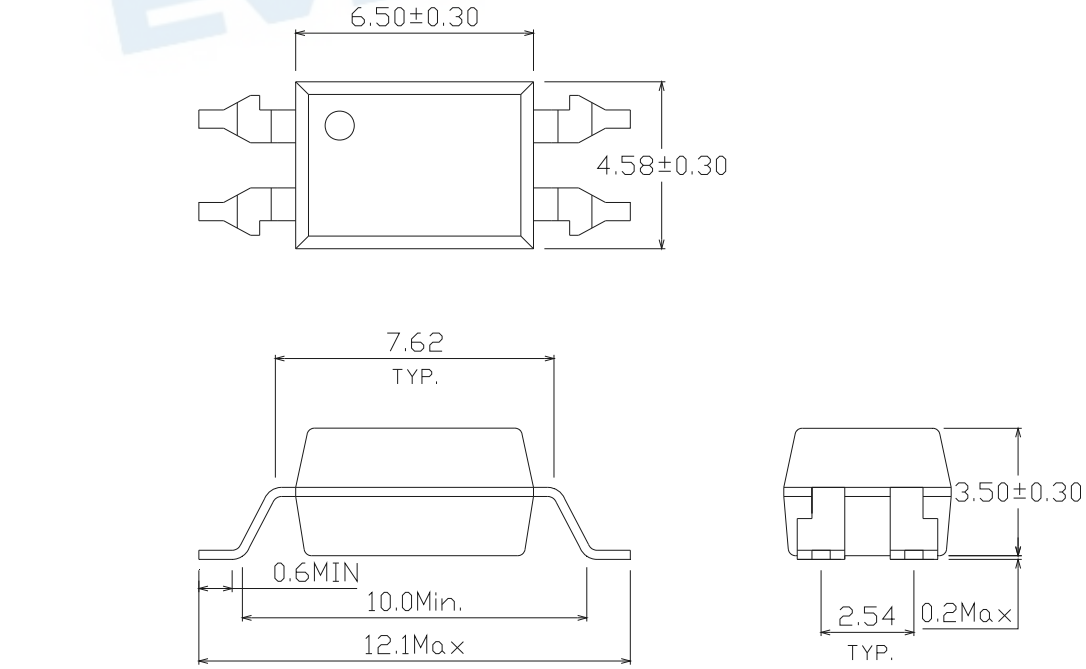
Option M Type



Option S1 Type

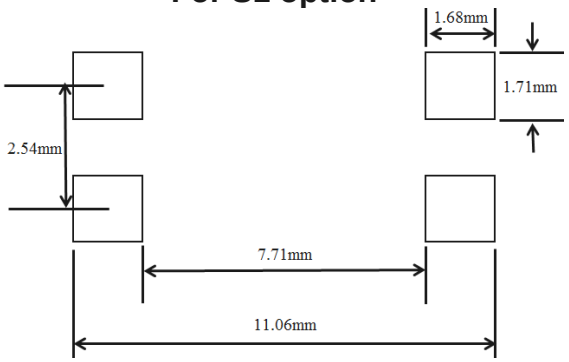


Option S2 Type

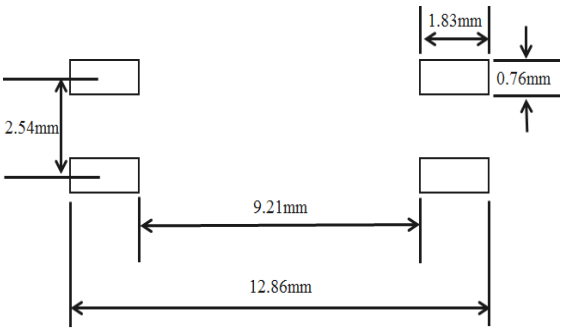


Recommended pad layout for surface mount leadform

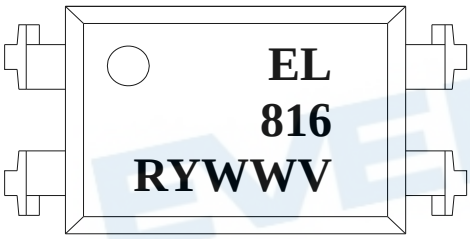
For S1 option



For S2 option



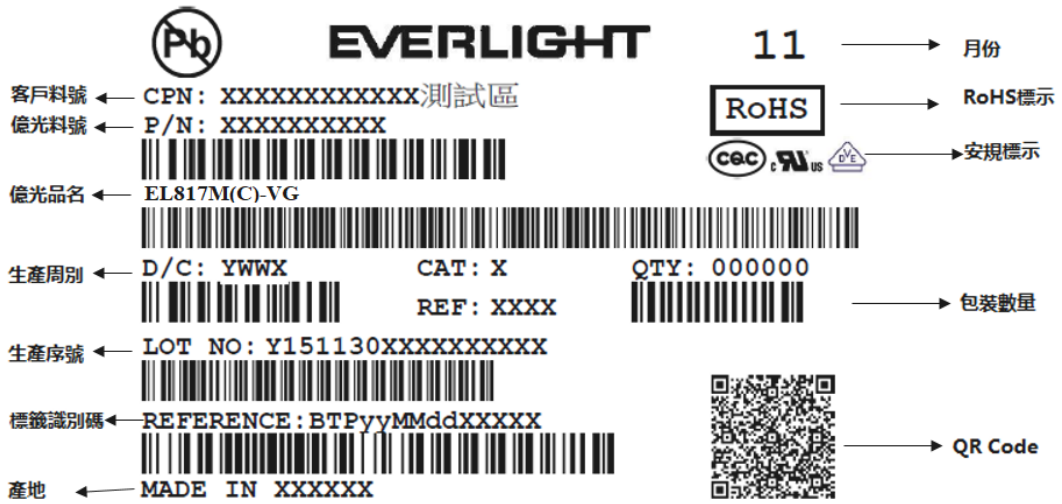
Device Marking



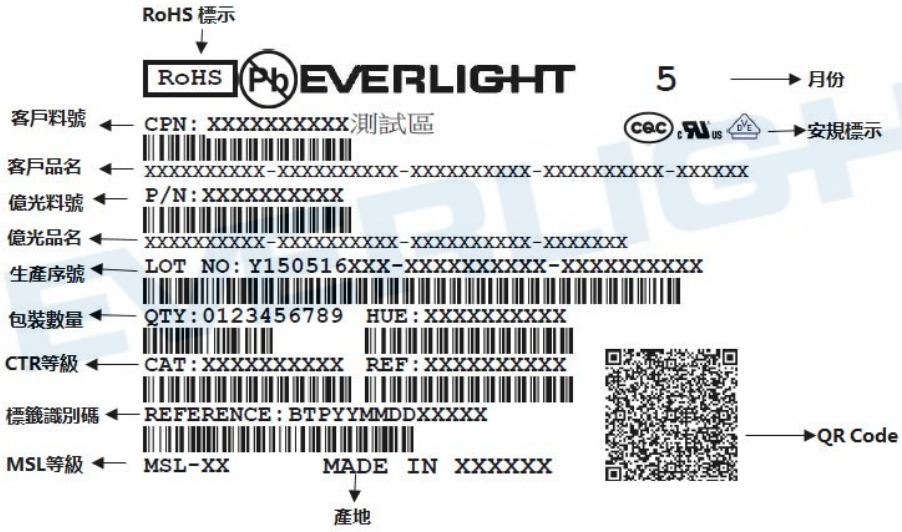
Notes

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)

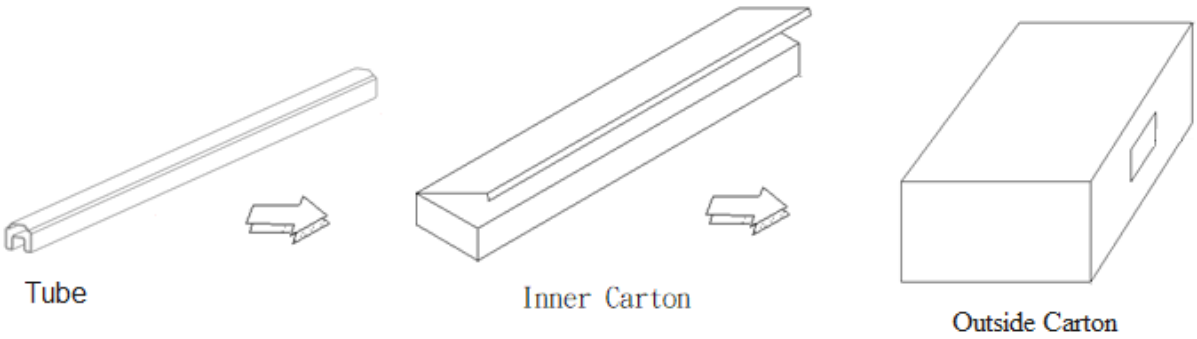
Label form



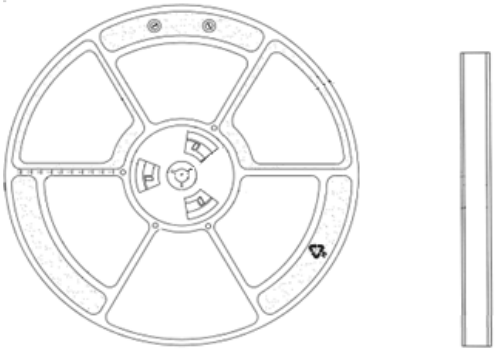
or



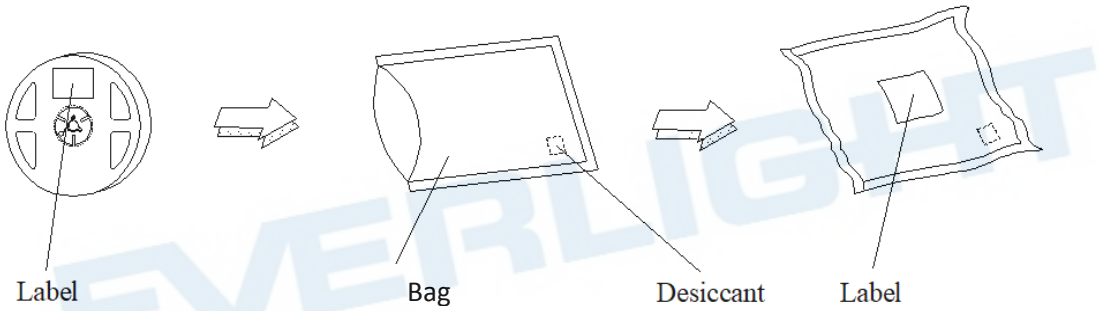
TUBE Dimension

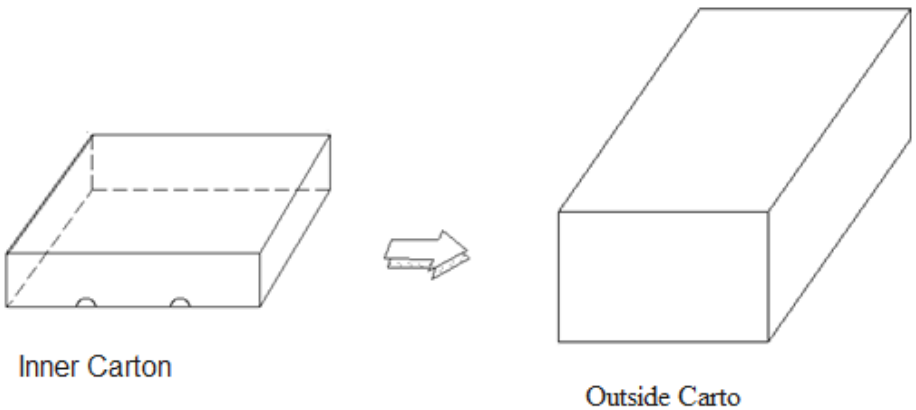


Reel Dimension



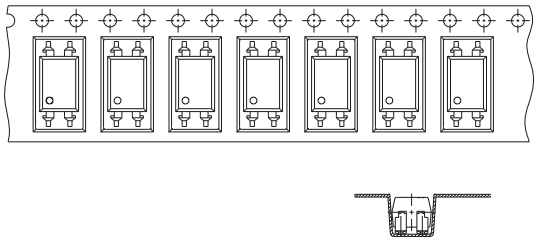
Moisture Resistant Packaging





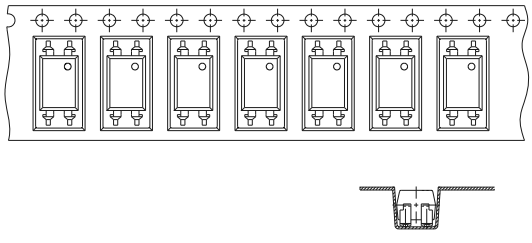
Tape & Reel Packing Specifications

Option TD



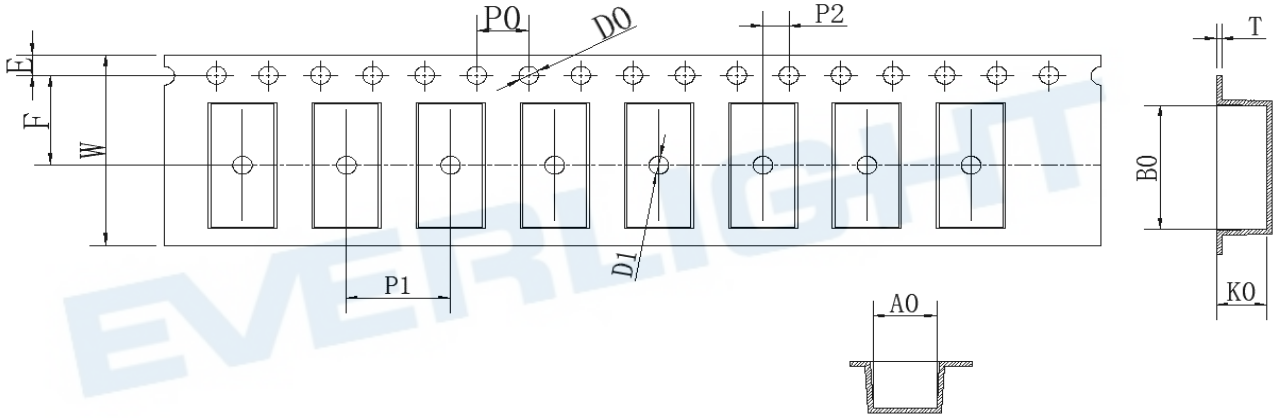
Direction of feed from reel

Option TU



Direction of feed from reel

Tape dimensions

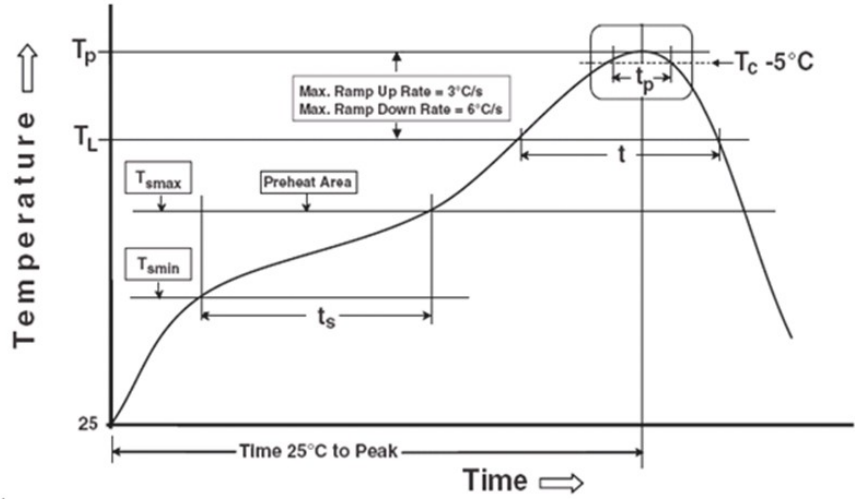


Dimension No.	Ao	Bo	Do	D1	E	F
Dimension (mm) S1	4.90±0.1	10.40±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.50±0.1
Dimension (mm) S2	4.88±0.1	12.55±0.1	1.5±0.1	1.50±0.1	1.75±0.1	11.5±0.1
Dimension No.	Po	P1	P2	t	W	Ko
Dimension (mm) S1	4.00±0.1	8.00±0.1	2.00±0.1	0.40±0.1	16.00±0.3	4.00±0.1
Dimension (mm) S2	4.00±0.1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

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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.

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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