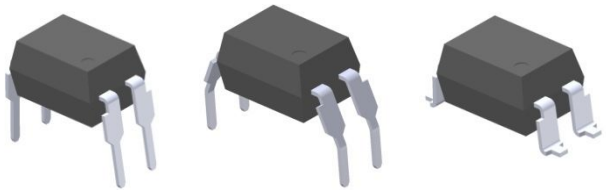
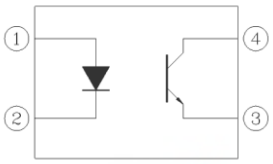
DATASHEET

4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER
EL816(D)-G Series



Schematic



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

Features:

- Compliance Halogens Free
  (Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- Current transfer ratio
  (CTR: 50~600% at I_F = 5mA, V_{CE} = 5V)
  (CTR: 63~125% at I_F = 10mA, V_{CE} = 5V)
  (CTR: 10~265% at I_F = 0.5mA, V_{CE} = 5V)
- High isolation voltage between input and output (Viso = 5000 V rms)
- Compact small outline package
- Compliance with EU REACH
- The product itself will remain within RoHS compliant version
- UL and cUL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved (No. 1406091)
- NEMKO approved (No. P11214765)
- DEMKO approved (No. D-03301)
- FIMKO approved (No. FI 27474)
- CQC approved (No. CQC08001022757)

Description

The EL816(D)-G series of devices each consist of an infrared emitting diodes, optically coupled to a phototransistor detector encapsulated with green compound. It is 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

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Absolute Maximum Ratings (Ta=25°C) *1

	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	P_D	100	mW
	Derating factor (above T_a = 100°C)		2.9	mW/°C
Output	Power dissipation	P_C	150	mW
	Derating factor (above T_a = 100°C)		5.8	mW/°C
	Collector current	I_C	50	mA
	Collector-Emitter voltage	V_{CEO}	80	V
	Emitter-Collector voltage	V_{ECO}	7	V
Total Power Dissipation		P_{TOT}	200	mW
Isolation Voltage*2		V_{ISO}	5000	Vrms
Operating Temperature		T_{OPR}	-55 ~ +110	°C
Storage Temperature		T_{STG}	-55 ~ +125	°C
Soldering Temperature*3		T_{SOL}	260	°C
Maximum Junction Temperature*4		$T_{J(max)}$	125	°C

Notes
*1 Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.
*2 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.
*3 For 10 seconds
*4 This value is for information only and is for the bare chip condition, not for the module conditions.

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Electrical 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

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}	7	-	-	V	I_E = 0.1mA

Transfer Characteristics

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Current Transfer ratio	EL816A	CTR	50	-	150	%	I_F = 5mA, V_{CE} = 5V
	EL816B		130	-	260		
	EL816C		200	-	400		
	EL816D		300	-	600		
	EL816X		100	-	200		
	EL816Y		150	-	300		
	EL816A		10	-	70		I_F = 0.5mA, V_{CE} = 5V
	EL816B		25	-	120		
	EL816C		45	-	180		
	EL816D		70	-	265		
	EL816X		20	-	95		
	EL816Y		30	-	135		
	EL816J		10	-	60		
	EL816J		63	-	125		I_F = 10mA, V_{CE} = 5V

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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

* Typical values at T_a = 25°C

Transfer Characteristics (T_a=25°C unless specified otherwise)

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Turn on time	Ton	-	5	-	μs	V_{CE} = 2V, I_C = 2mA, R_L = 100Ω
Turn off time	Toff	-	6	-	μs	
Rise time	t_r	-	-	18	μs	
Fall time	t_f	-	-	18	μs	

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Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

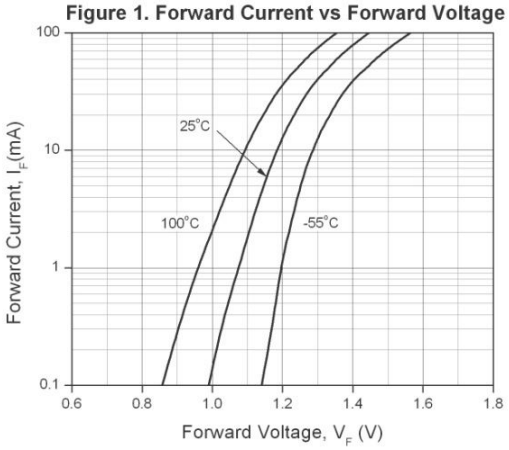

Figure 2. Normalized Collector Current vs Forward Current

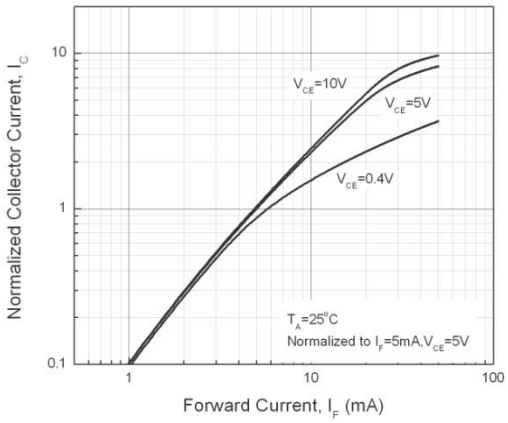

Figure 3. Normalized Current Transfer Ratio vs Forward Current

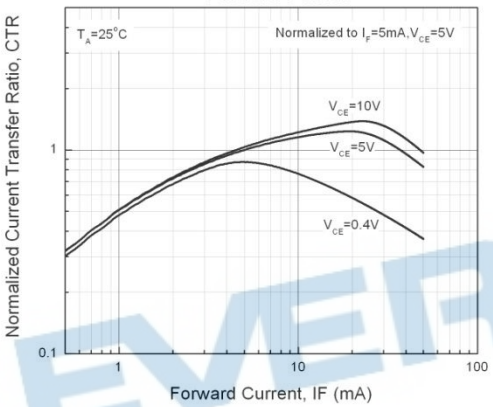

Figure 4. Normalized Collector Current vs Ambient Temperature

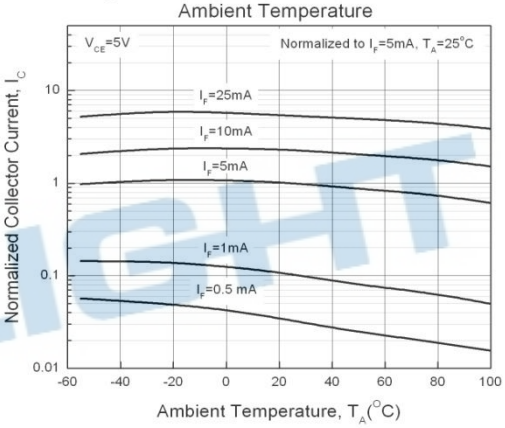

Figure 5. Collector Current vs Collector-Emitter Voltage

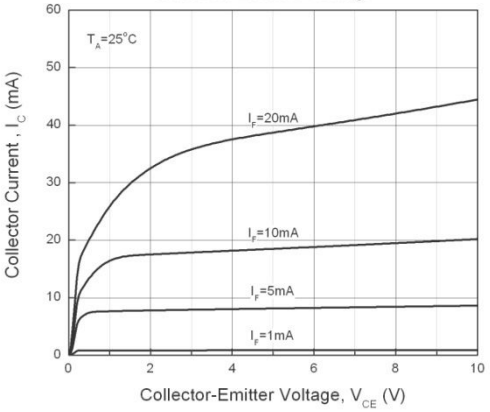

Figure 6. Collector Current vs Collector-Emitter Voltage

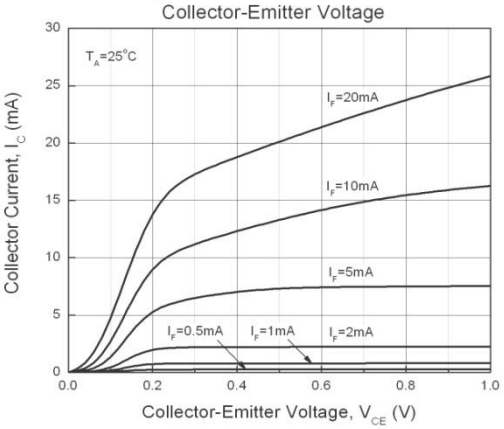

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Figure 7. Collector Dark Current vs Ambient Temperature

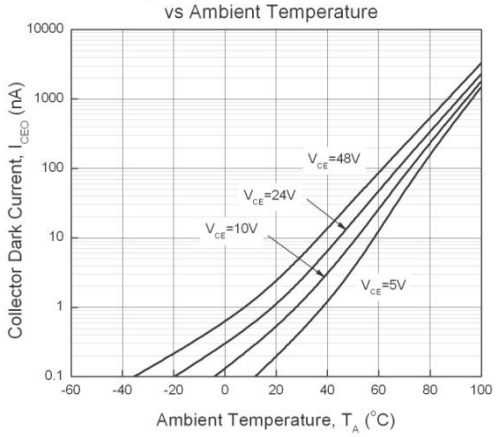


Figure 8. Switching Time vs Load Resistance

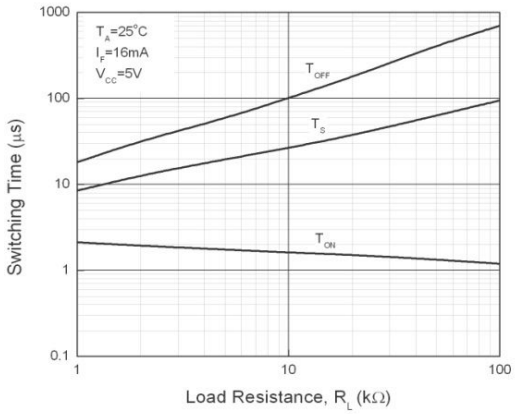


Figure 9. Collector-Emitter Saturation Voltage vs Ambient Temperature

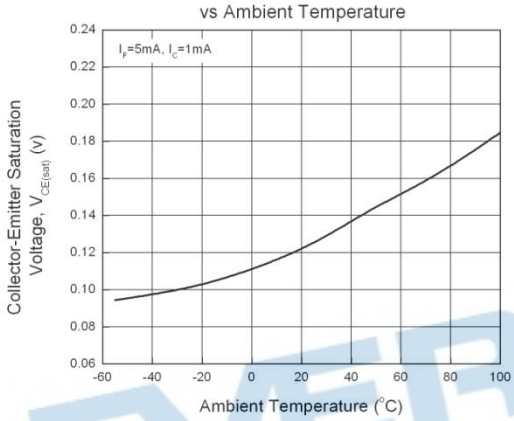
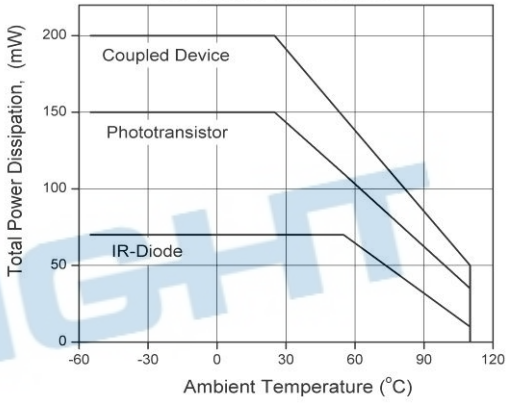


Figure 10. Total Power Dissipation vs Ambient Temperature



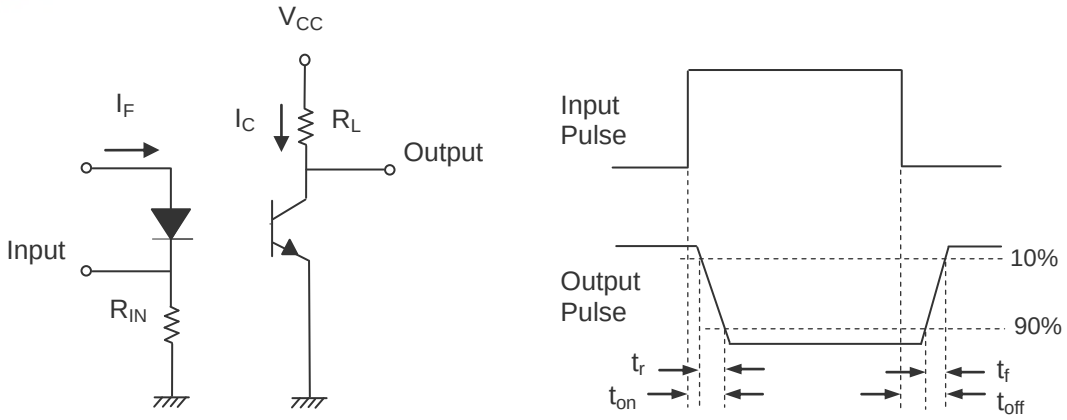


Figure 11. Switching Time Test Circuit & Waveforms

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Order Information

Part Number

EL816X(Y)(Z)(D)-VG

Notes

X = Lead form option (S, S1, M or none)
Y = CTR Rank (A, B, C, D, X, Y or J)
Z = Tape and reel option (TU, TD or none)
D = Customer code
V = VDE safety (optional)
G = Halogens free

Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S (TU)	Surface mount lead form + TU tape & reel option	1500 units per reel
S (TD)	Surface mount lead form + TD tape & reel option	1500 units per reel
S1 (TU)	Surface mount lead form (low profile) + TU tape & reel option	1500 units per reel
S1 (TD)	Surface mount lead form (low profile) + TD tape & reel option	1500 units per reel

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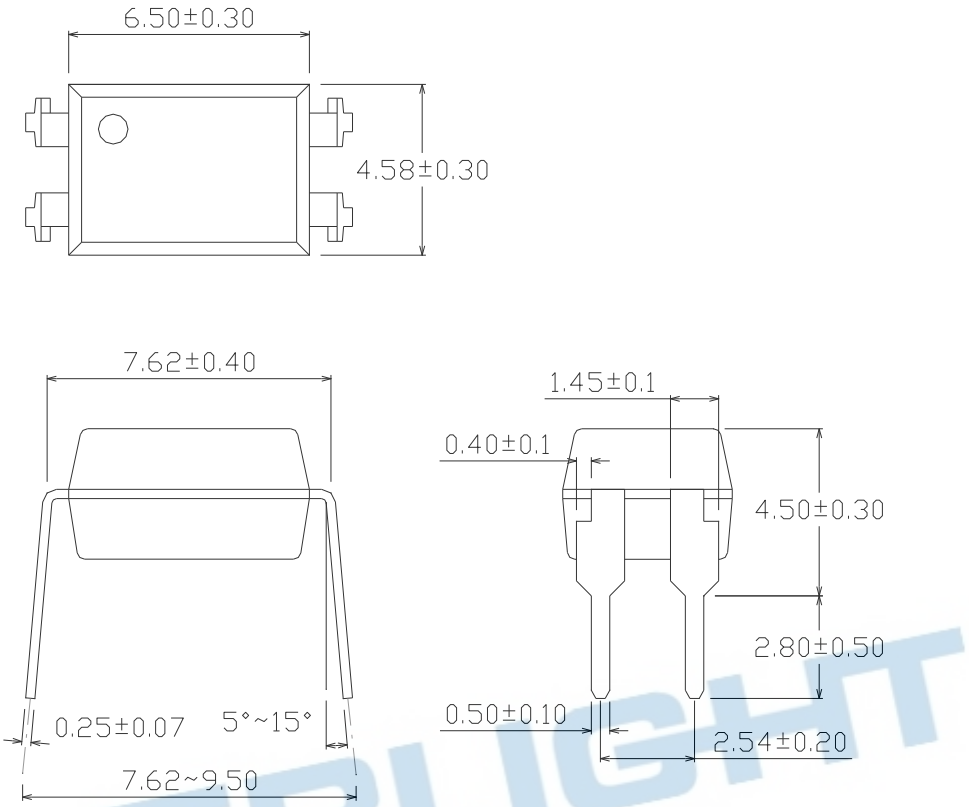
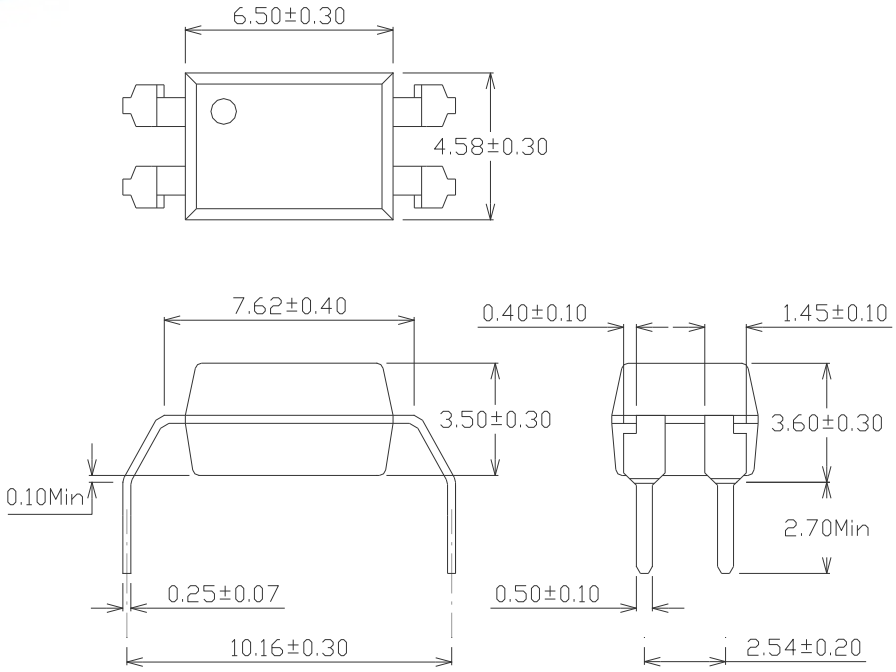
Package Dimension (Dimensions in mm)

Standard DIP Type



Option M Type



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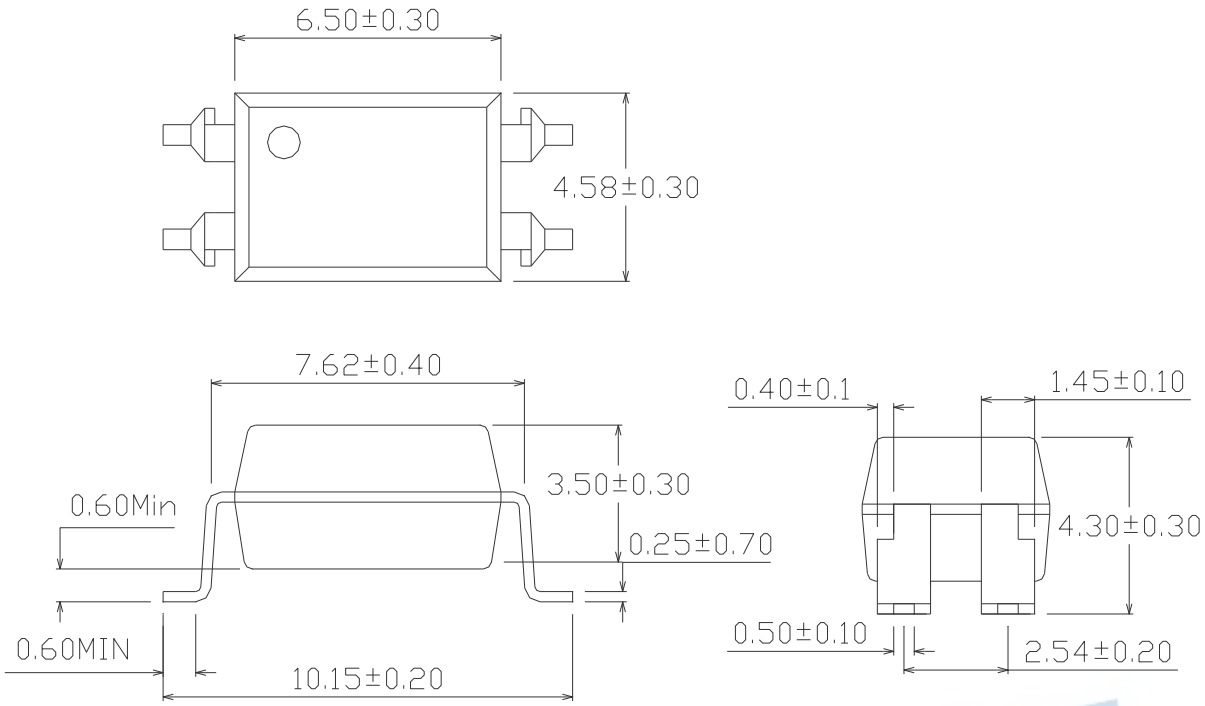
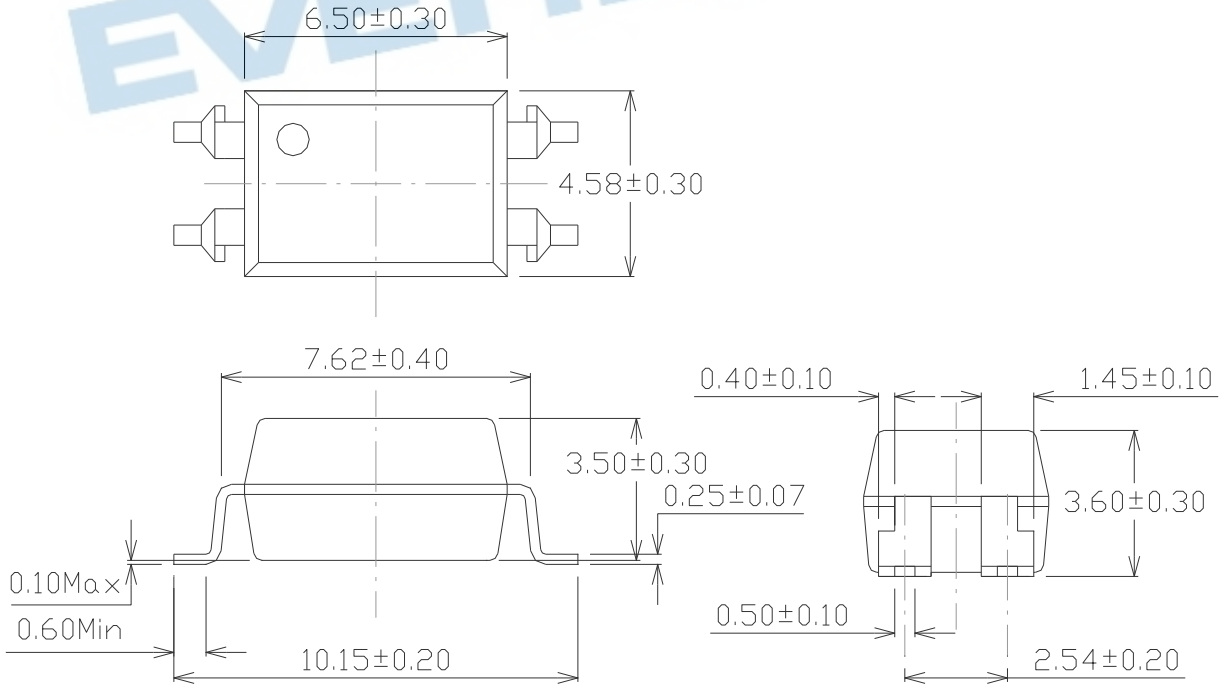
Option S Type



Option S1 Type



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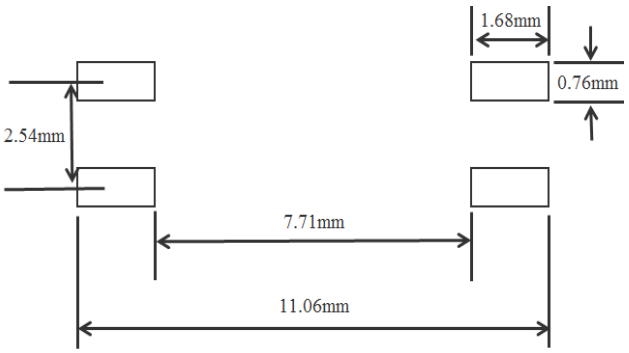
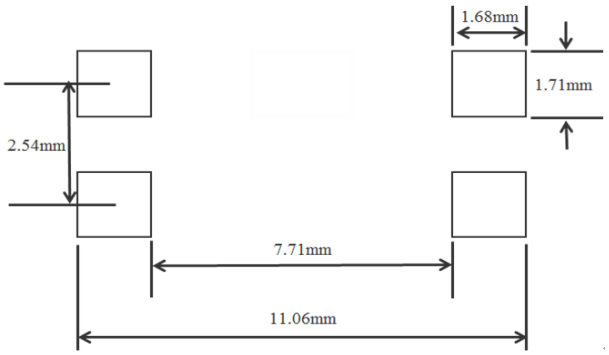
Recommended pad layout for surface mount leadform

For S option



For S1 option



Notes

Suggested pad dimension is just for reference only.
Please modify the pad dimension based on individual need.

Device Marking

Notes

EL816	denotes Device Number
G	denotes Factory Code (G: China and Green part)
R	denotes CTR Rank (A, B, C, D, X, Y or J)
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE safety (optional)

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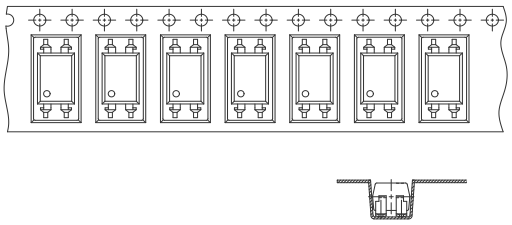
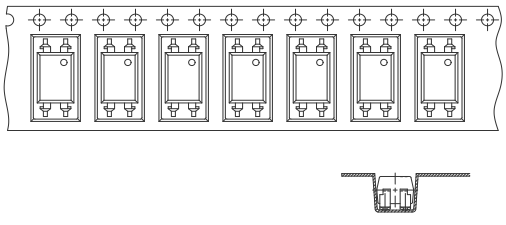
Tape & Reel Packing Specifications

Option TD

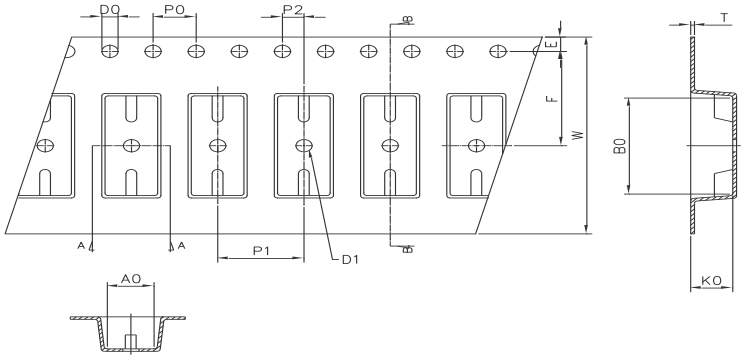


Option TU



Direction of feed from reel

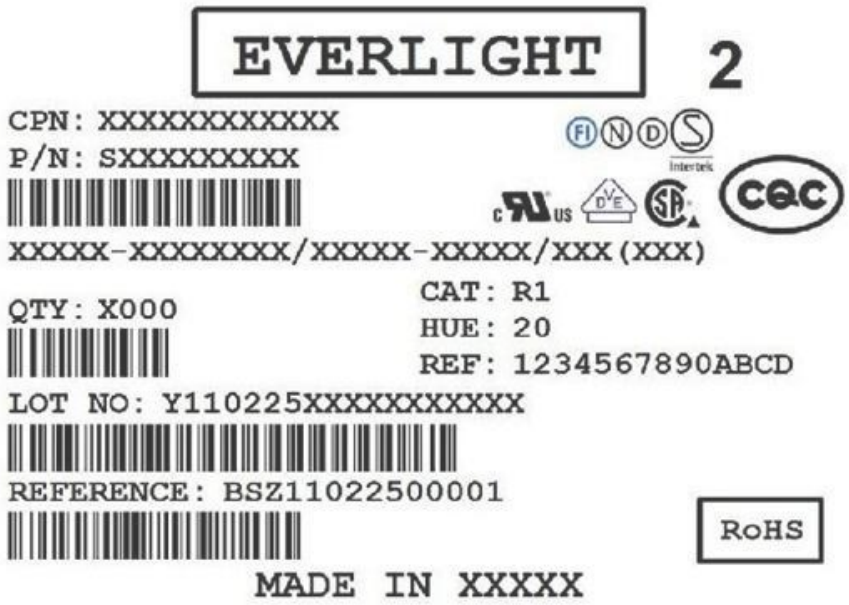
Tape dimensions



Dimension No.	Ao	Bo	Do	D1	E	F
Dimension (mm) S.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 No.	**Po**	**P1**	**P2**	**t**	**W**	**Ko**
Dimension (mm) S.S1	4.00±0.1	8.00±0.1	2.00±0.1	0.40±0.1	16.00±0.3	4.60±0.1

Label Format

Inner packing box



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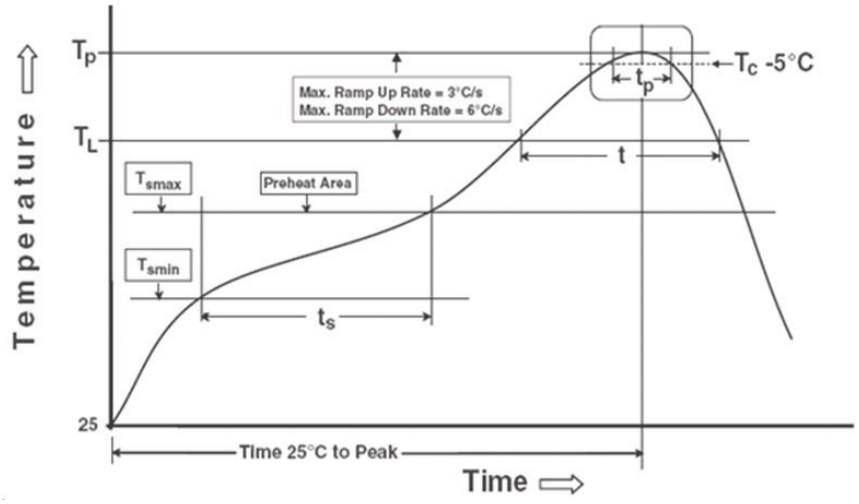
Precautions for Use

1. Soldering Condition

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



Notes	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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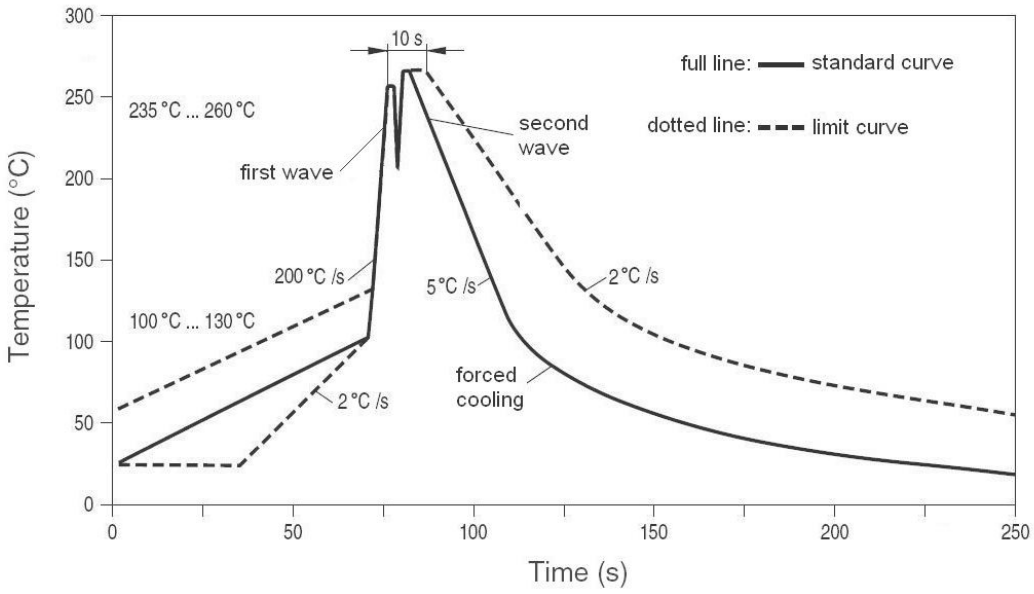
Wave solder Temperature prolife



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