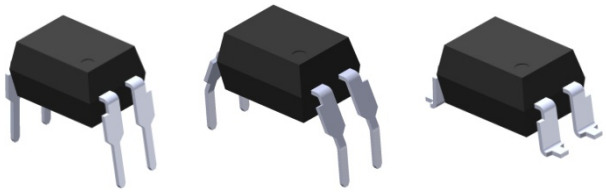
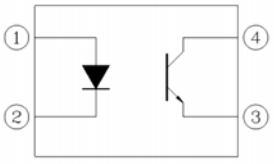
DATASHEET

4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER
EL816 Series



Schematic



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

Features:

- 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 inputs and output (Viso=5000 V rms)
- Creepage distance >7.62 mm
- Operating temperature up to +110°C
- Compact small outline package
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA 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

Copyright © 2010, Everlight All Rights Reserved. Release Date : May 13, 2013. Issue No: DPC-0000009 Rev. 10

Absolute Maximum Ratings (Ta=25℃)

	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	V rms
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

Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

Electro-Optical Characteristics (Ta=25℃ 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}	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	-	-		

Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

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	-	4	18	μs	V_{CE} = 2V, I_C = 2mA, R_L = 100Ω
Fall time	t_f	-	3	18	μs	

* Typical values at T_a = 25°C

Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

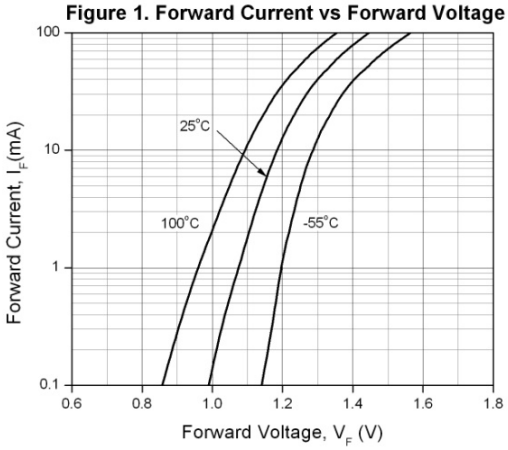


Figure 2. Normalized Collector Current vs Forward Current

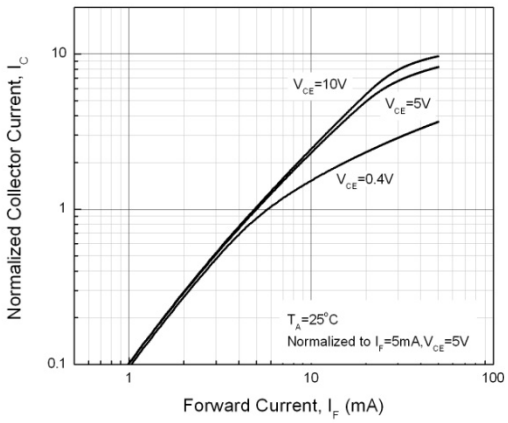


Figure 3. Normalized Current Transfer Ratio vs Forward Current

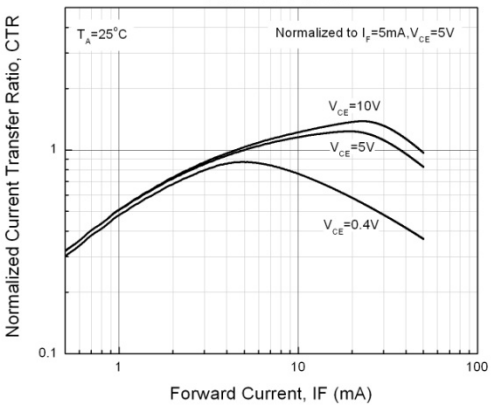


Figure 4. Normalized Collector Current vs Ambient Temperature

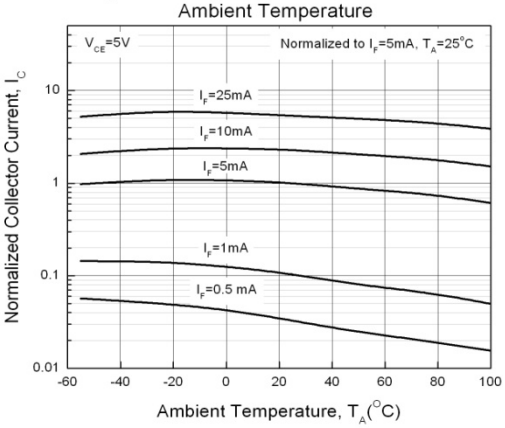


Figure 5. Collector Current vs Collector-Emitter Voltage

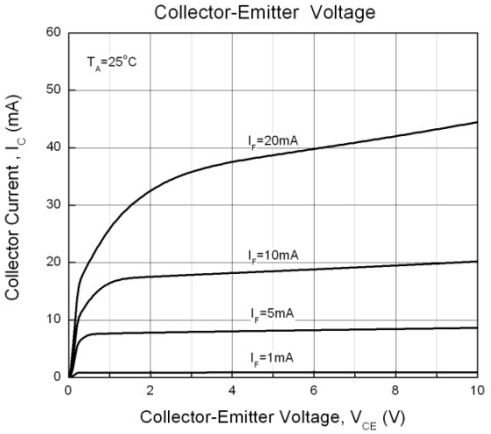
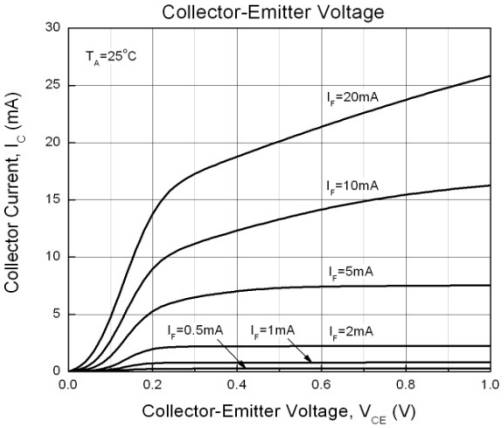


Figure 6. Collector Current vs Collector-Emitter Voltage



Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

Figure 7. Collector Dark Current vs Ambient Temperature

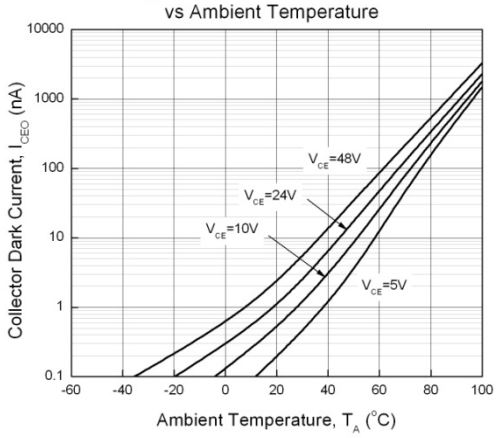


Figure 8. Switching Time vs Load Resistance

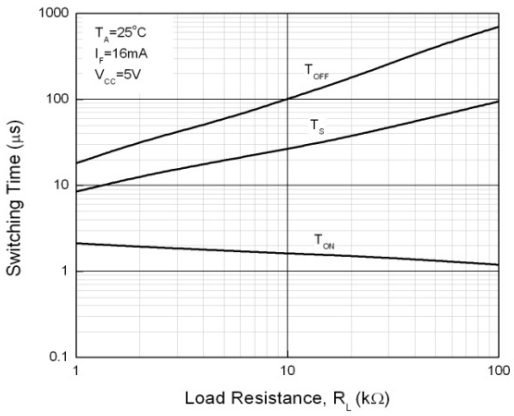
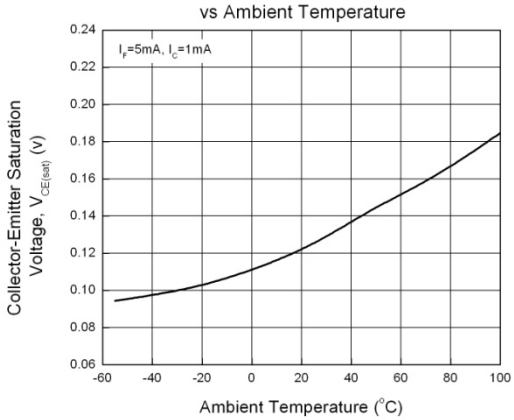


Figure 9. Collector-Emitter Saturation Voltage vs Ambient Temperature



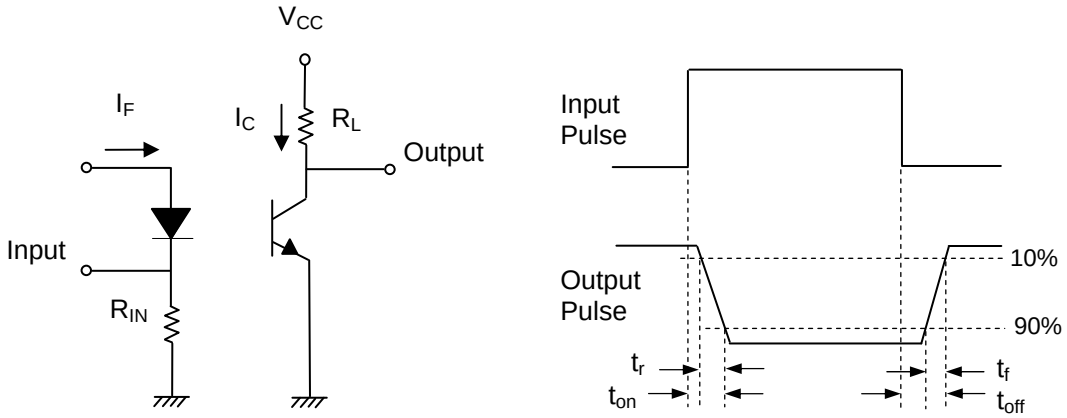


Figure 10. Switching Time Test Circuit & Waveforms

Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

Order Information

Part Number

EL816X(Y)(Z)-FV

Note

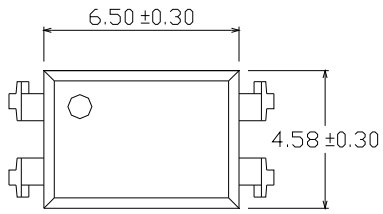
X = Lead form option (S, S1, S2, M or none)
Y = CTR Rank (A, B, C, D, X, Y, I, J, K or none)
Z = Tape and reel option (TA, TB, TU, TD or none).
F = Lead frame option (F: Iron, None: copper)
V = VDE safety (optional).

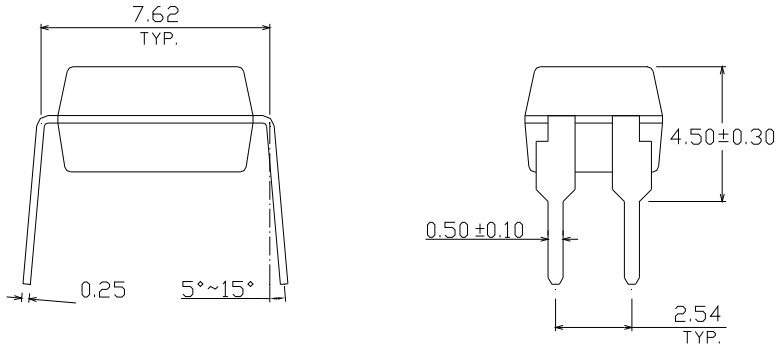
Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel
S1 (TB)	Surface mount lead form (low profile) + TB tape & reel option	1000 units per reel
S2 (TA)	Surface mount lead form (Gull-wing) + TA tape & reel option	1000 units per reel
S2 (TB)	Surface mount lead form (Gull-wing) + TB tape & reel option	1000 units per reel
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

Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

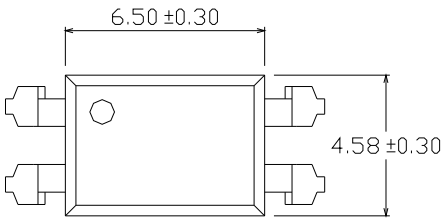
Package Dimension (Dimensions in mm)

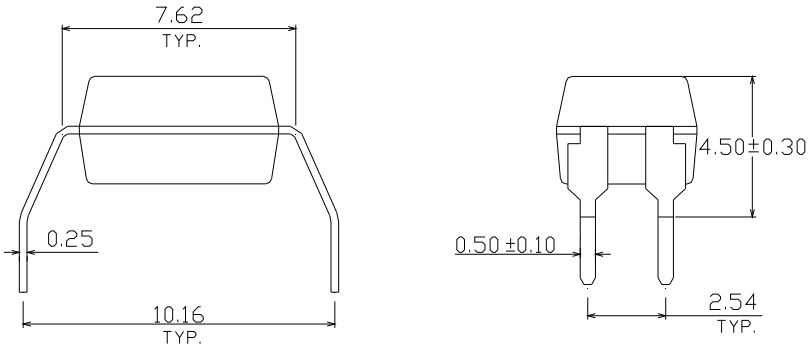
Standard DIP Type





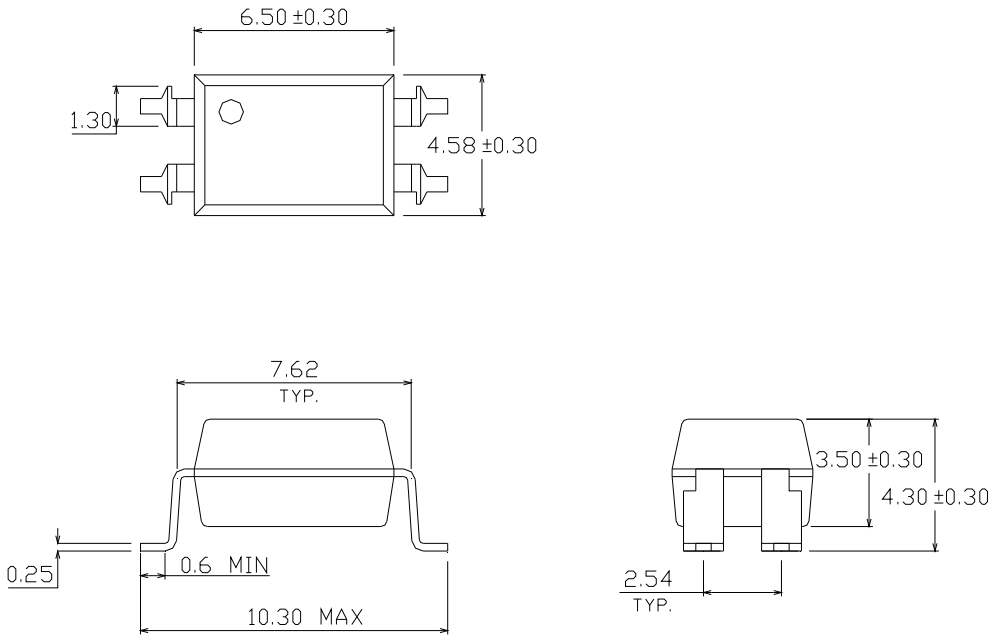
Option M Type



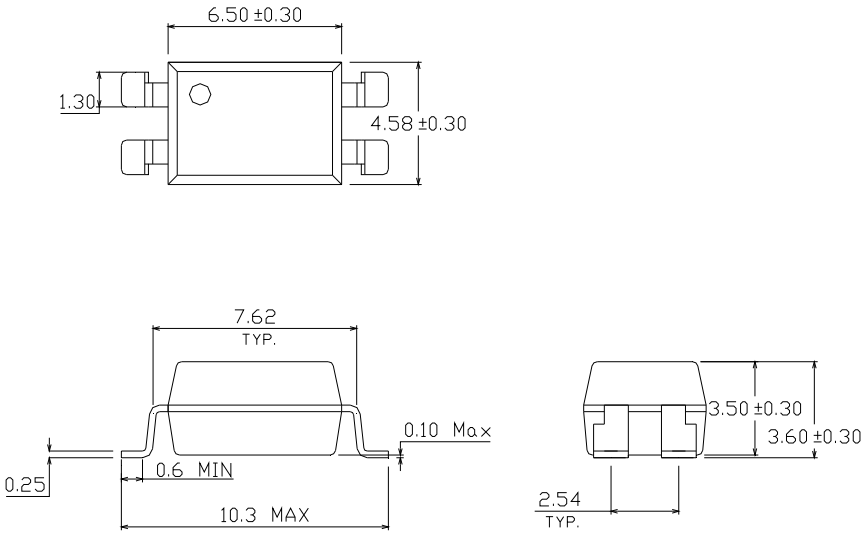


Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

Option S Type

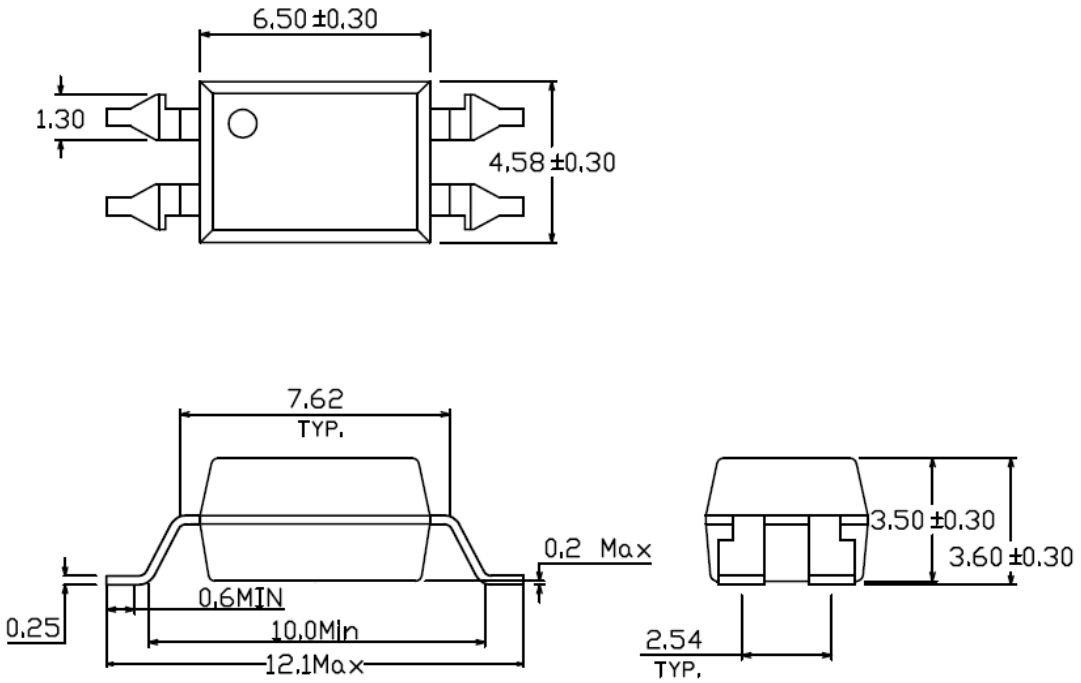


Option S1 Type



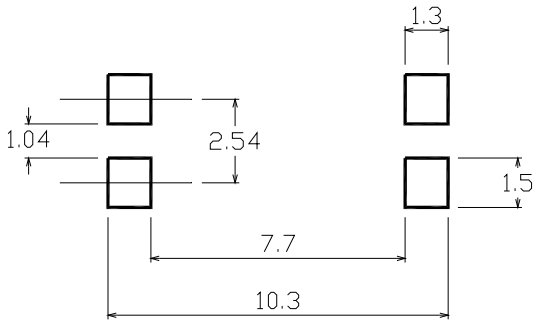
Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

Option S2 Type

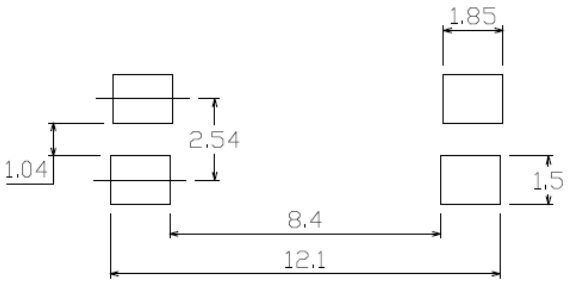


Recommended pad layout for surface mount leadform

For S and S1 option



For S2 option



Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

Device Marking



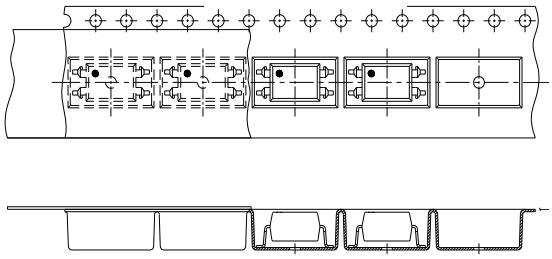
Notes

EL	denotes EVERLIGHT
816	denotes Device Number
R	denotes CTR Rank
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

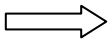
Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

Tape & Reel Packing Specifications

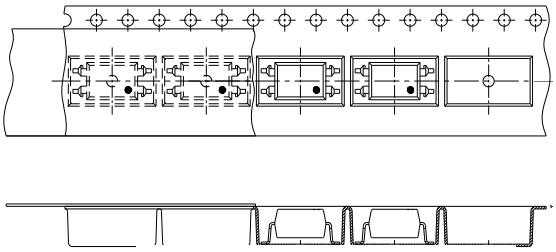
Option TA



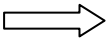
Direction of feed from reel



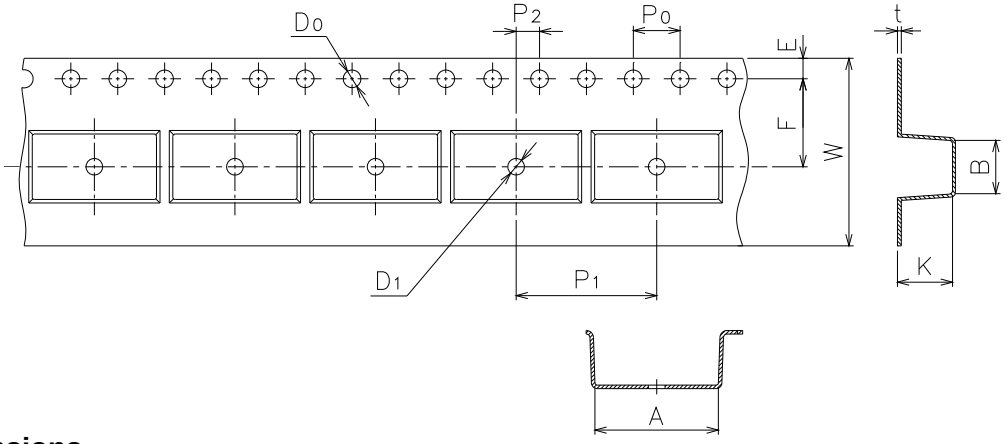
Option TB



Direction of feed from reel



Tape dimensions

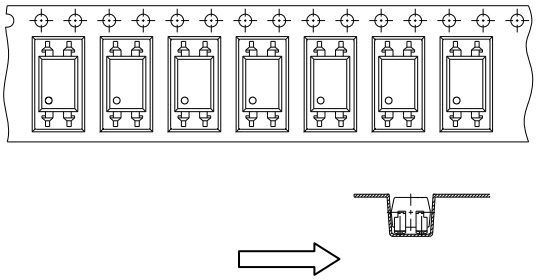


Tape dimensions

Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.5±0.1	4.65±0.1	1.55±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension (mm) S2	12.15±0.1	4.65±0.1	1.55±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.1	12.0±0.1	2.0±0.1	0.35±0.1	16.0±0.3	4.75±0.1
Dimension (mm) S2	4.0±0.1	16.0±0.1	2.0±0.1	0.35±0.1	16.0±0.3	3.90±0.1

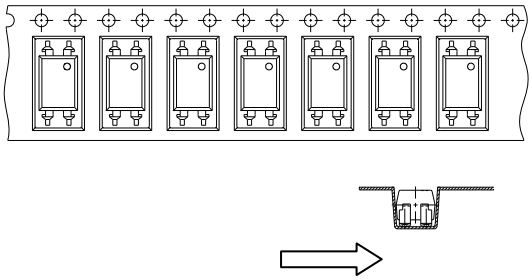
Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

Option TD



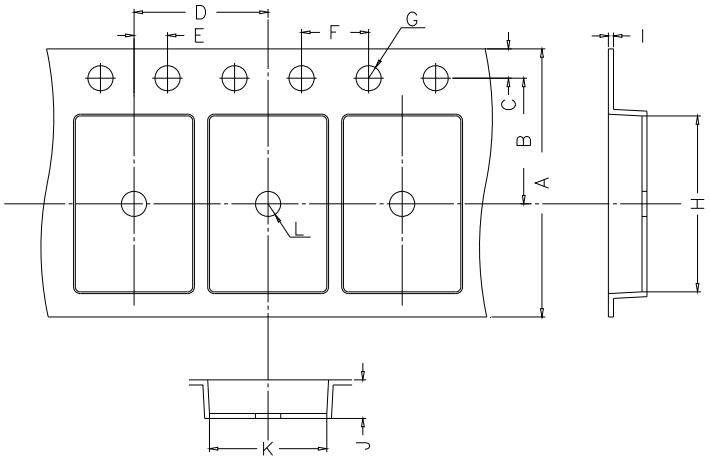
Direction of feed from reel

Option TU



Direction of feed from reel

Tape dimensions



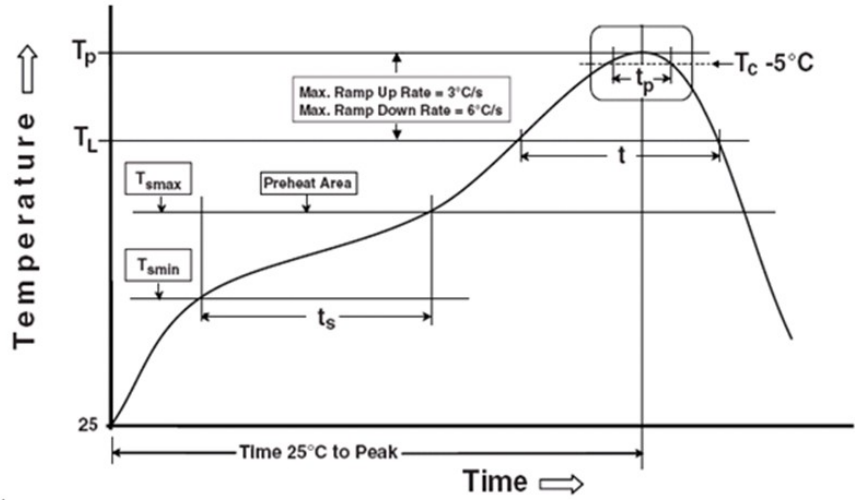
Dimension No.	A	B	C	D	E	F
Dimension(mm)	16.00±0.3	7.5±0.1	1.75±0.1	8.0±0.1	2.0±0.1	4.0±0.1
Dimension No.	G	H	I	J	K	L
Dimension(mm)	1.55±0.05	10.4±0.1	0.4±0.05	4.60±0.1	5.1±0.1	1.55±0.05

Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10

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 : May 21, 2013. Issue No:DPC-0000009 Rev. 10

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.

Copyright © 2010, Everlight All Rights Reserved. Release Date : May 21, 2013. Issue No:DPC-0000009 Rev. 10