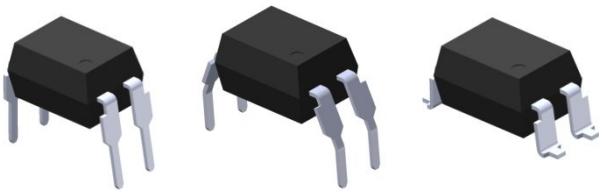




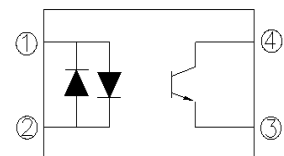
THE DATASHEET OF EL814S1(TD)



4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER AC INPUT PHOTOCOUPLER EL814 Series



Schematic



Pin Configuration

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

Features:

- AC input response
- Current transfer ratio (CTR: Min. 20% at $I_F = \pm 1\text{mA}$, $V_{CE} = 5\text{V}$)
- High isolation voltage between input and output (Viso=5000 V rms)
- Wide Operating temperature range $-55\sim 110^\circ\text{C}$
- High collector-emitter voltage $V_{CEO}=80\text{V}$
- Compact dual-in-line package
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA approved
- CQC approved

Description

The EL814 series of devices each consist of two infrared emitting diodes, connected in inverse parallel, optically coupled to a phototransistor detector. They are packaged in a 4-pin DIP package and available in side-lead spacing and SMD option.

Applications

- AC line monitor
- Programmable controllers
- Telephone line interface
- Unknown polarity DC sensor

Absolute Maximum Ratings (Ta=25 °C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I_F	±60	mA
	Peak forward current (t = 10µs)	I_{FM}	1	A
	Power dissipation	P_D	100	mW
	Derating factor (above 100 °C)		2.9	mW/°C
Output	Power dissipation	P_C	150	mW
	Derating factor (above 100 °C)		5.8	mW/°C
	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

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	$I_F = \pm 20\text{mA}$
Input capacitance	C_{in}	-	50	250	pF	$V = 0, f = 1\text{KHz}$

Output

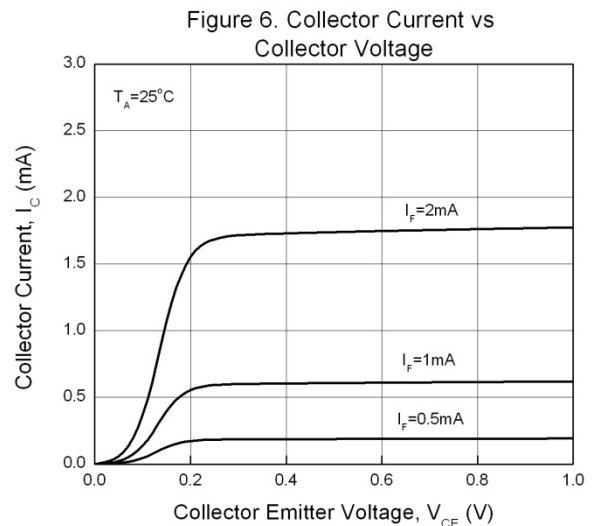
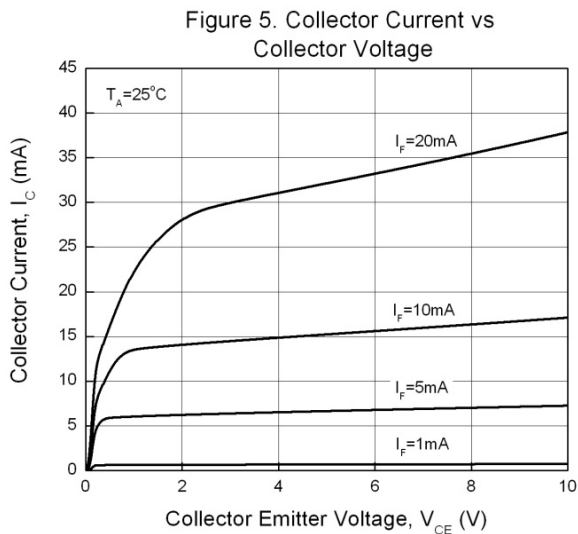
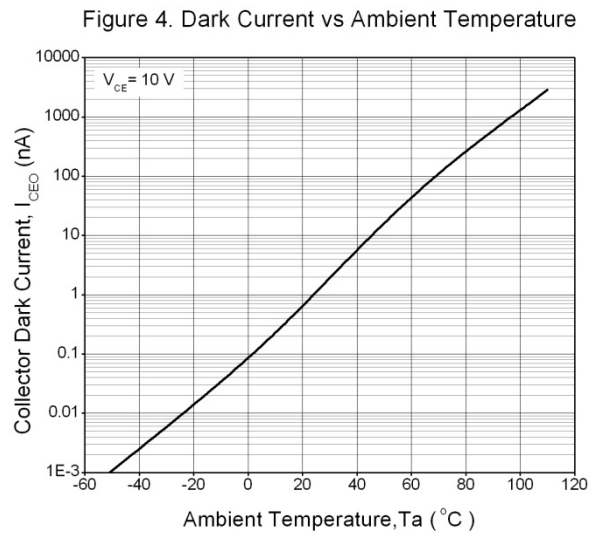
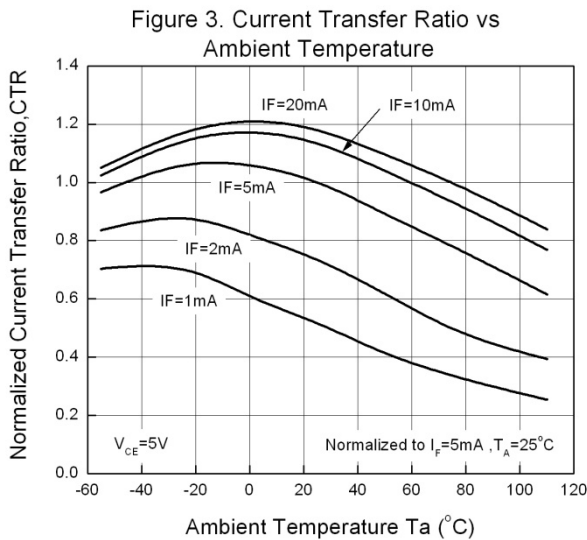
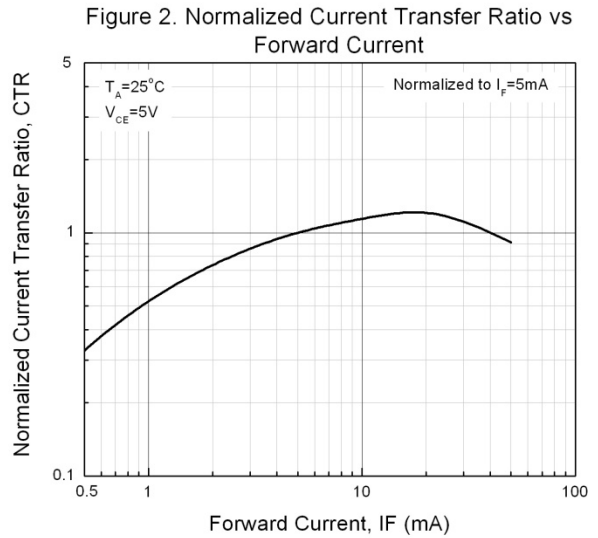
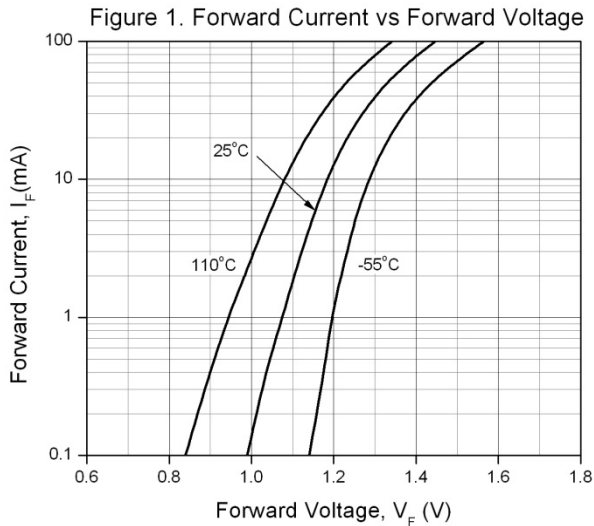
Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Emitter dark current	I_{CEO}	-	-	100	nA	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$
Collector-Emitter breakdown voltage	BV_{CEO}	80	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	BV_{ECO}	6	-	-	V	$I_E = 0.1\text{mA}$

Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	EL814	20	-	300	%	$I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$
	EL814A	50	-	150		
CTR Symmetry		0.7		1.3		$I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$	-	0.05	0.2	V	$I_F = \pm 20\text{mA}, I_C = 1\text{mA}$
Isolation resistance	R_{IO}	5×10^{10}	10^{11}	-	Ω	$V_{IO} = 500\text{Vdc}, 40\sim 60\% \text{R.H}$
Cut-off frequency	f_c	-	80	-	kHz	$V_{CE} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega, -3\text{dB}$
Floating capacitance	C_{IO}	-	0.6	1.0	pF	$V_{IO} = 0, f = 1\text{MHz}$
Rise time	T_r	-	7	18	μs	$V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$
Fall time	T_f	-	11	18	μs	

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

Typical Electro-Optical Characteristics Curves



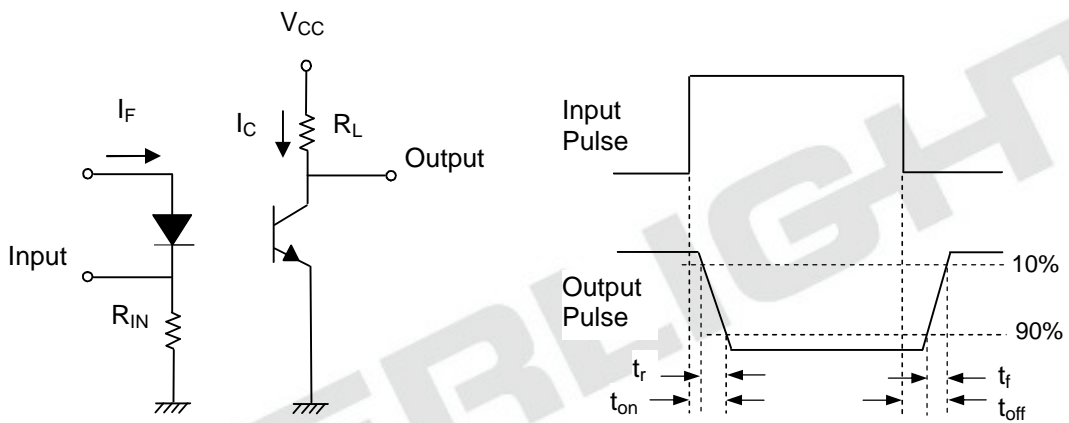
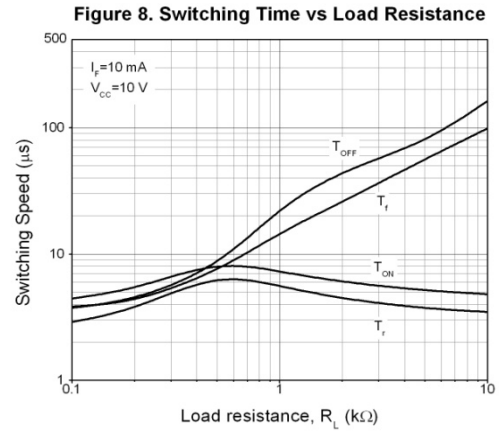
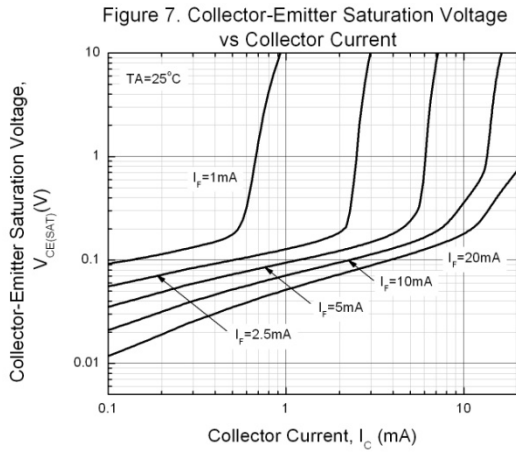


Figure 9. Switching Time Test Circuit & Waveforms

Order Information

Part Number

EL814X(Y)(Z)-V

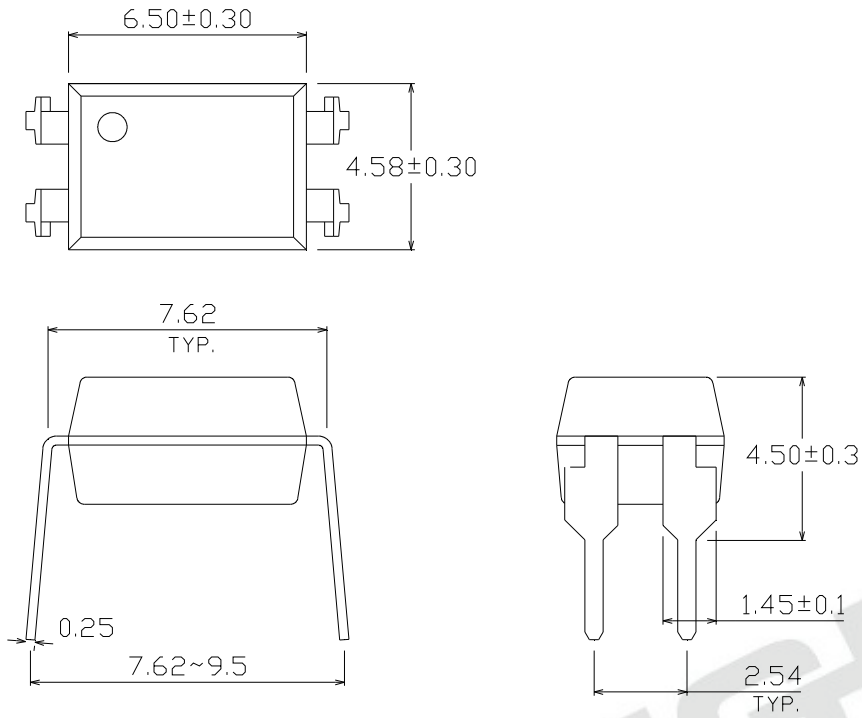
Note

- X = Lead form option (S, S1, M or none)
- Y = CTR Rank (A or none)
- Z = Tape and reel option (TA, TB, TU, TD or none).
- V = VDE safety (optional).

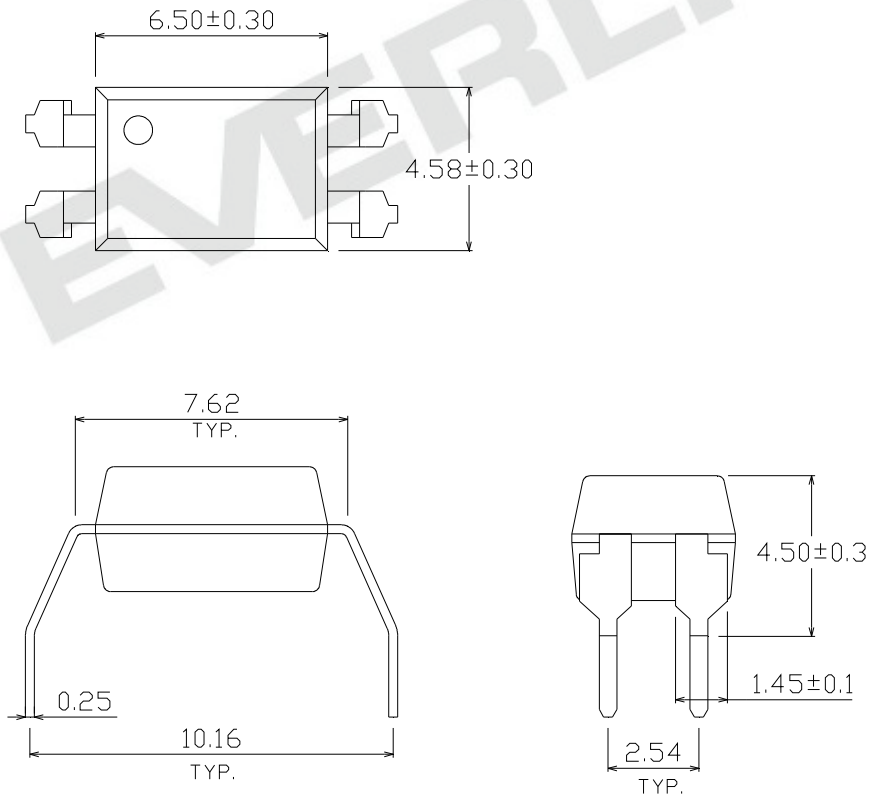
Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount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

Package Dimension (Dimensions in mm)

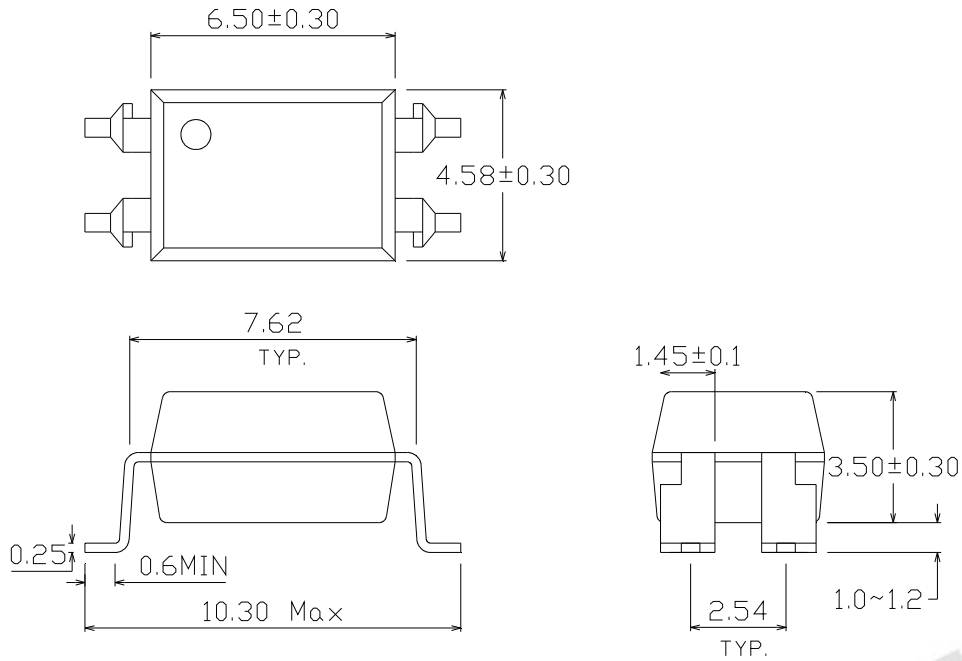
Standard DIP Type



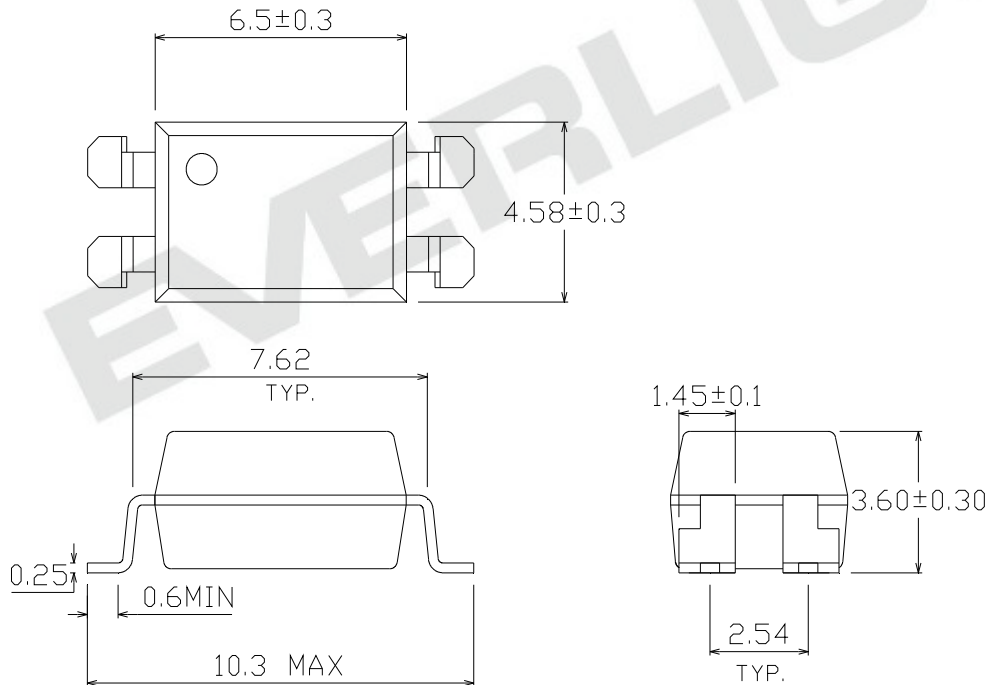
Option M Type



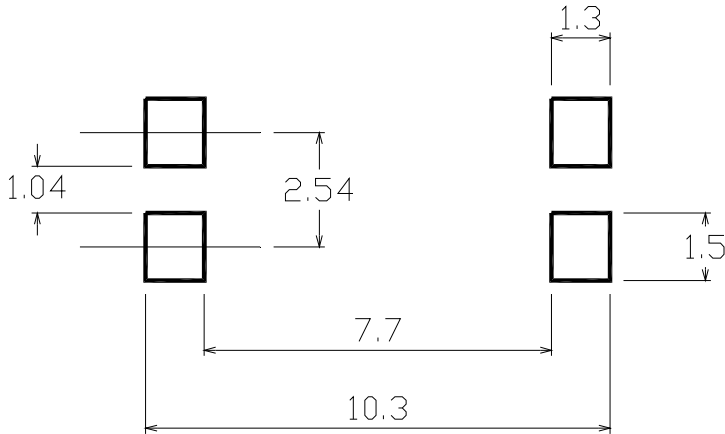
Option S Type



Option S1 Type



Recommended pad layout for surface mount leadform



Device Marking

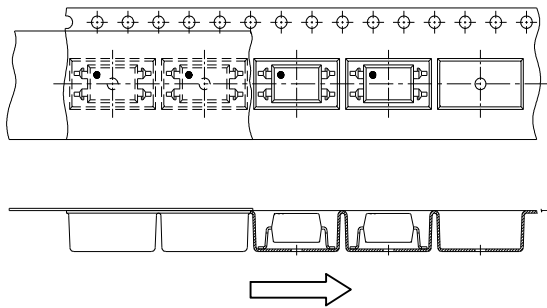


Notes

- EL denotes EVERLIGHT
- 814 denotes Device Number
- R denotes CTR Rank (A or none)
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE (optional)

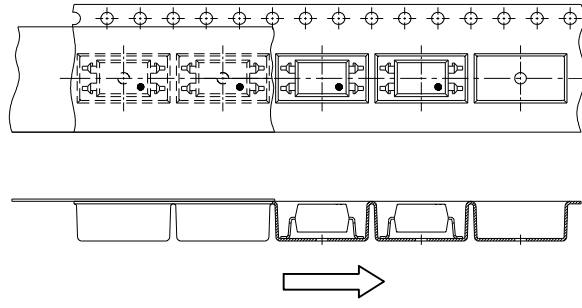
Tape & Reel Packing Specifications

Option TA



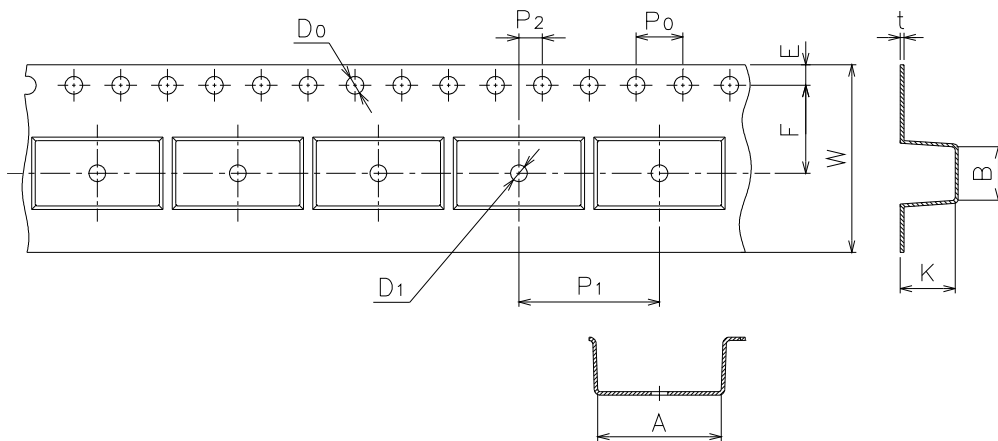
Direction of feed from reel

Option TB



Direction of feed from reel

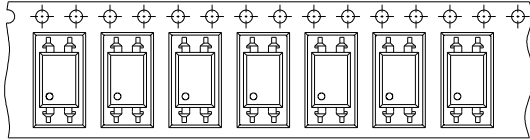
Tape dimensions



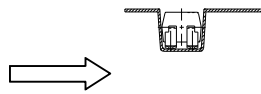
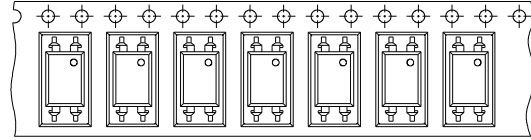
Dimension No.	A	B	Do	D1	E	F
Dimension (mm) S	10.5±0.1	4.65±0.1	1.55±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension (mm) S1	10.5±0.1	4.65±0.1	1.55±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm) S	4.0±0.1	12.0±0.1	2.0±0.1	0.4±0.1	16.0±0.3	5.05±0.1
Dimension (mm) S1	4.0±0.1	12.0±0.1	2.0±0.1	0.4±0.1	16.0±0.3	4.75±0.1

Tape & Reel Packing Specifications

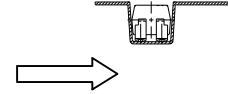
Option TD



Option TU

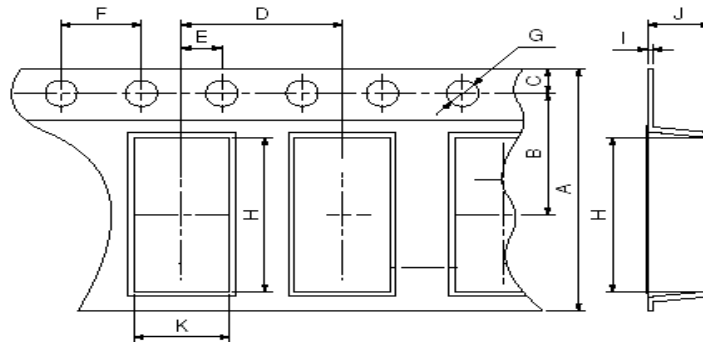


Direction of feed from reel



Direction of feed from reel

Tape dimensions

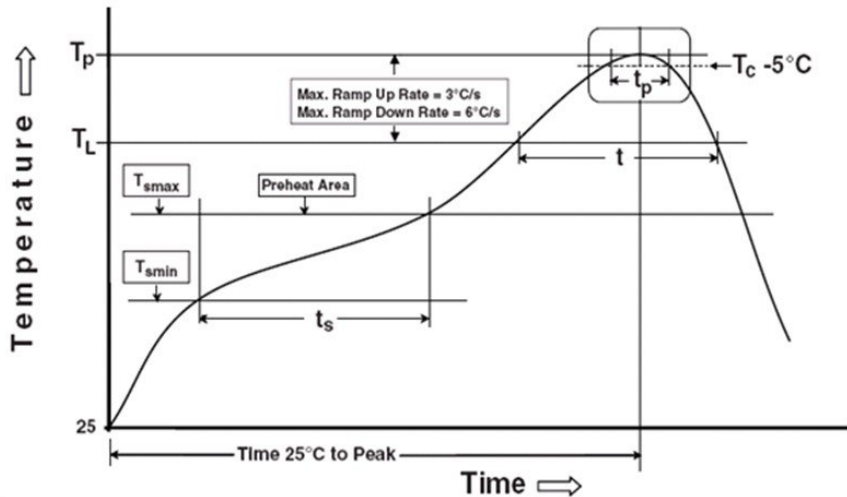


Dimension No.	A	B	C	D	E	F
Dimension(mm)	16.00±0.3	7.5±0.1	1.75±0.1	8.0±0.1	2.0±0.1	4.0±0.1
Dimension No.	G	H	I	J	K	
Dimension(mm)	1.5±0.1	10.4±0.1	0.4±0.1	4.60±0.1	5.1±0.1	

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

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