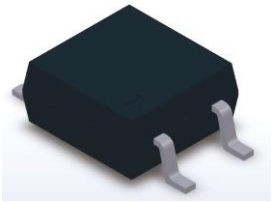
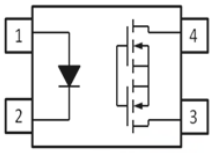
DATASHEET

4 PIN MINI FLAT PACKAGE SOLID STATE RELAY
ELM406A-G Series Datasheet



Schematic



Pin Configuration
1,LED Anode
2.LED Cathode
3.4, MOSFET

Features

- Compliance Halogen Free(Br < 900ppm, Cl < 900ppm, Br+Cl < 1500ppm)
- Normally open signal pole signal throw relay
- Small 4pin SOP package in the 60 V load voltage series
- Lower operation current
- Low-level off state leakage current
- Low on resistance
- Compliance with EU REACH
- Pb free and RoHS compliant
- UL and cUL (approved)
- VDE (approved)
- SEMKO (approved)
- NEMKO (approved)
- FIMKO (approved)
- CQC (approved)

Description

The ELM406A-G is solid state relays containing an AlGaAs infrared LEDs on the light emitting side (input side) optically coupled to a high voltage output detector circuit. The detector consists of a photovoltaic diode array and MOSFETs on the output side. The single channel configuration is equivalent to 1 form A . The devices in a 4-pin small outline SMD package

Applications

- Exchange equipment
- Measurement and testing equipment
- FA/OA equipment
- Industrial controls
- Security

Absolute Maximum Ratings (T_A=25 °C, unless otherwise specified)

	Parameter	Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	5	V
	Peak Forward Current*1	I_{FP}	1	A
	Power Dissipation	P_{in}	75	mW
Output	Break Down Voltage*2	V_L	60	V
	Continuous Load Current*2	I_L	550	mA
	Pulse Load Current*3	I_{LPeak}	1.2	A
	Power Dissipation	P_{out}	500	mW
Total Power Dissipation		P_T	800	mW
Isolation Voltage*4		V_{iso}	3750	Vrms
Storage Temperature		T_{STG}	-40 to 125	°C
Operating Temperature		T_{OPR}	-40 to 85	°C
Soldering Temperature*5		T_{SOL}	260	°C

Notes:
*1. f =100Hz, Duty Cycle = 0.1%
*2. Indicate the peak AC and DC values
*3.A connection: 100ms (1 shot), V_L = DC or Peak AC
*4.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.
*5.For 10 seconds

Electro-Optical Characteristics (T_A=25 °C)

	Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input	Forward Voltage	V_F	I_F = 10mA	-	1.18	1.5	V
	Reverse Current	I_R	V_R = 5V	-	-	1	μA

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

	Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Output	Off State leakage Current	I_{leak}	I_F = 0mA, V_L = Max.	-	-	1	μA
	On Resistance	$R_{d(ON)}$	I_F = 10mA, I_L = Max. t = 1s	-	0.7	2.5	Ω
	Output Capacitance	C_{out}	V_L = 0V, f = 1MHz	-	85	-	pF
Transfer Characteristics	LED turn on Current	$I_{F(on)}$	I_L = Max	-	2.5	5	mA
	LED turn off current	$I_{F(off)}$	I_L = 1 μA	0.4	2.0	-	mA
	Turn On Time	T_{on}	I_F = 10 mA, I_L = MAX. R_L = 200Ω,	-	1.5	3	ms
	Turn Off Time	T_{off}			0.15	0.5	ms
	Isolation Resistance	R_{I-O}	V_{I-O} = 500V DC	5×10^{10}	-	-	Ω
	Isolation Capacitance	C_{I-O}	V = 0V, f = 1MHz	-	1.5	-	pF

Typical Electro-Optical Characteristics Curves

Fig.1 Load current vs. Ambient temperature

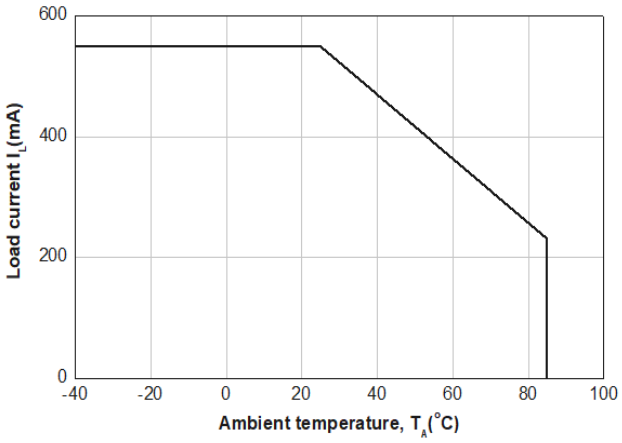


Fig.2 On resistance vs. Ambient temperature

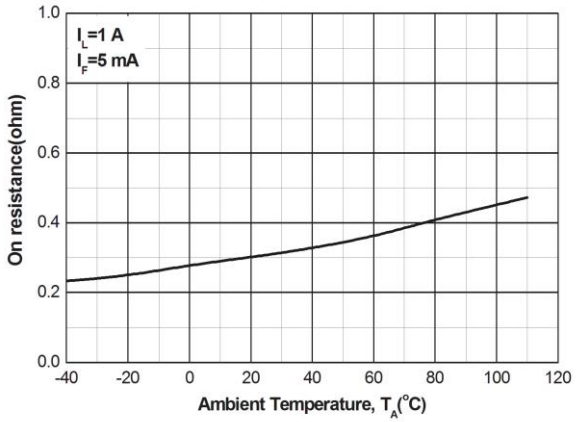


Fig.3 Switching time vs. Ambient Temperature

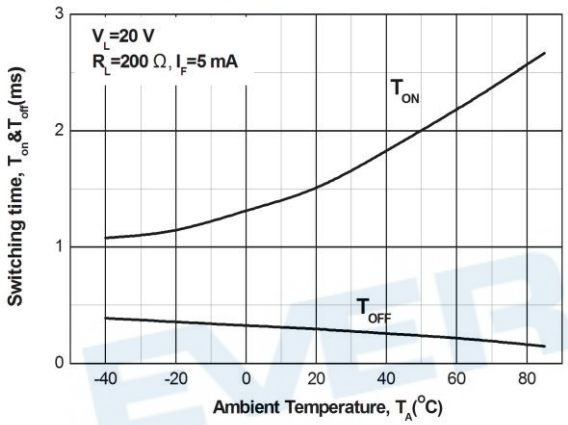


Fig.4 Turn on time&Turn off time vs. LED forward current

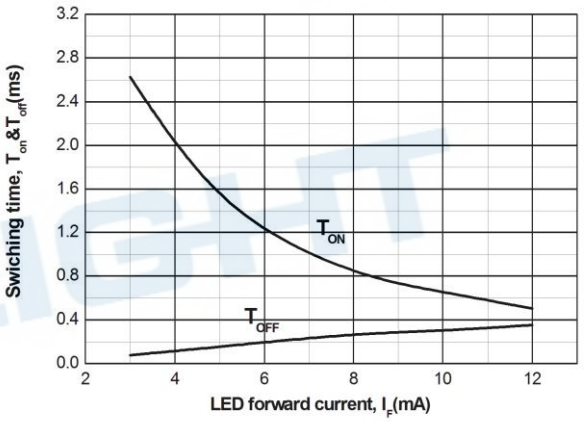


Fig.5 LED operate current vs. ambienttemperature

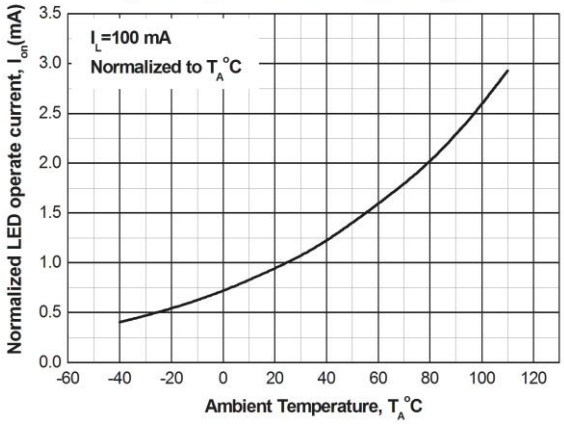


Fig.6 LED turn off current vs. ambienttemperature

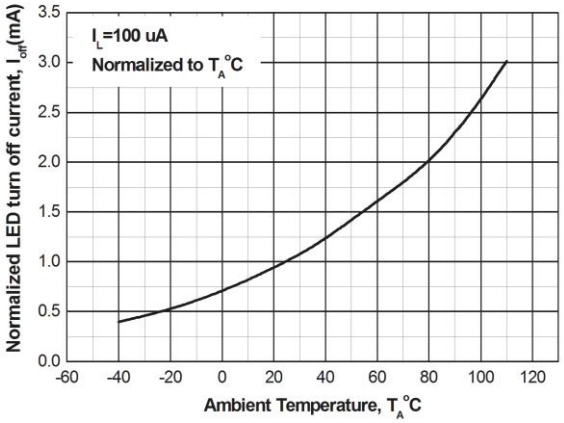


Fig.7 Load voltage vs Load current

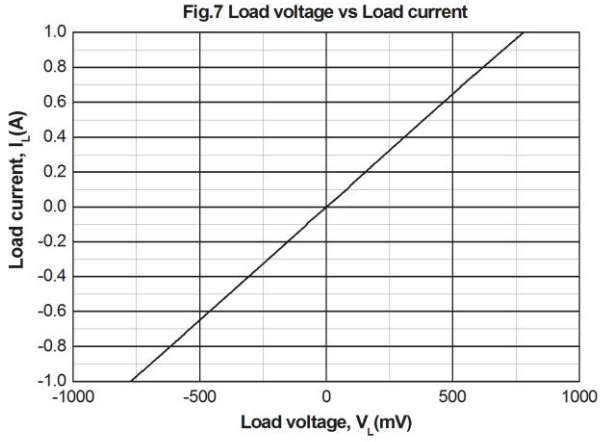
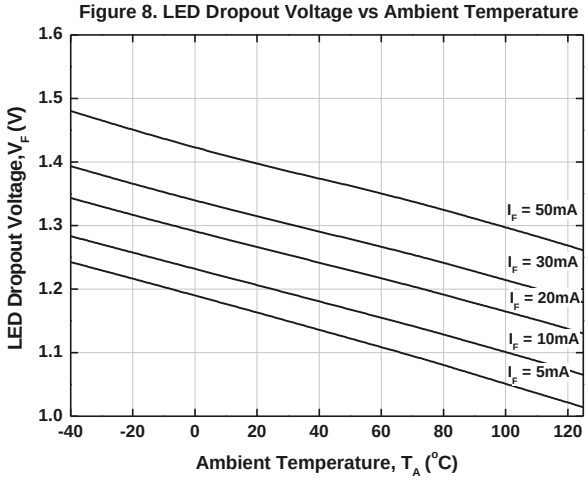
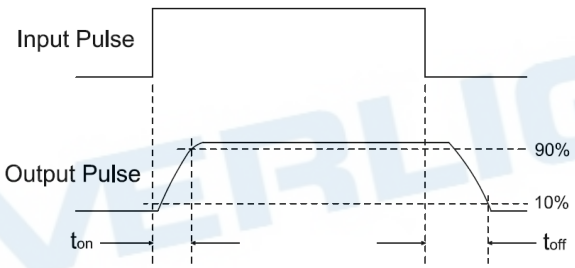


Figure 8. LED Dropout Voltage vs Ambient Temperature



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

Turn on/Turn off Time



Order Information

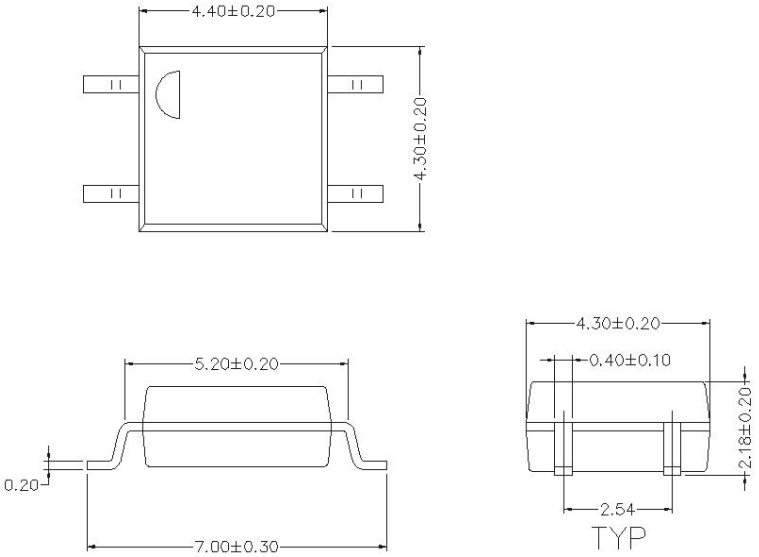
Part Number

ELM406A(X)-VG

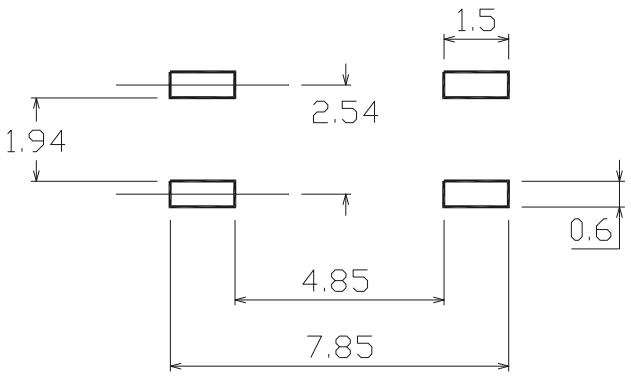
Note:
406A = Part No.
X = Tape and reel option (TA, TB or none)
V = VDE (optional)
G = Halogen free

Option	Description	Packing quantity
None	Standard SMD option	100 units per tube
-V	Standard SMD option + VDE	100 units per tube
(TA)	TA Tape & reel option	3500 units per reel
(TB)	TB Tape & reel option	3500 units per reel
(TA)-V	TA Tape & reel option + VDE	3500 units per reel
(TB)-V	TB Tape & reel option + VDE	3500 units per reel

Package Dimension (Dimensions in mm)



Recommended Pad Layout for Surface Mount Leadform



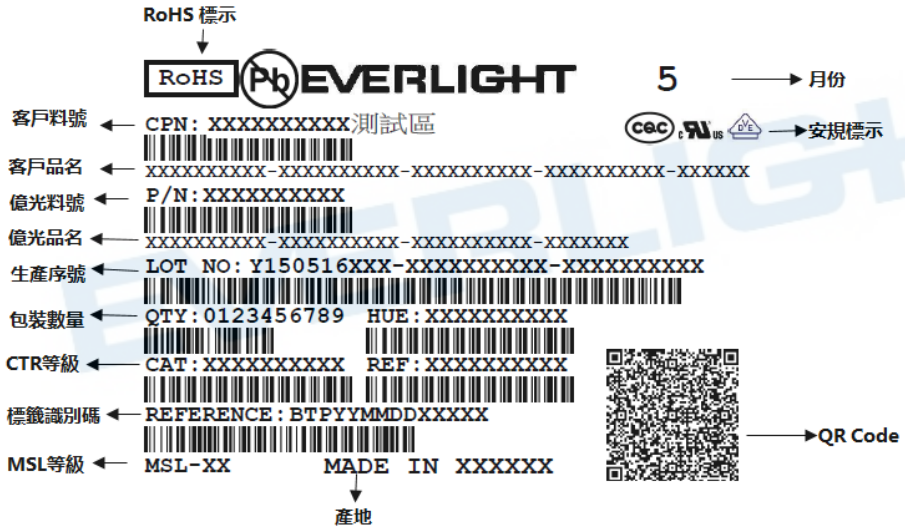
Device Marking

Notes

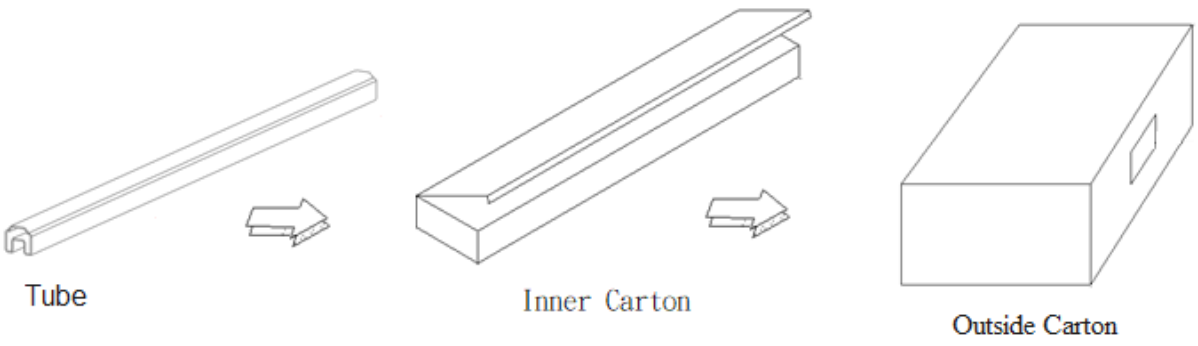
T	denotes Factory No code : made in China T : made in Taiwan
EL	denotes Everlight
M406A	denotes Part Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE approved (optional)

Label form

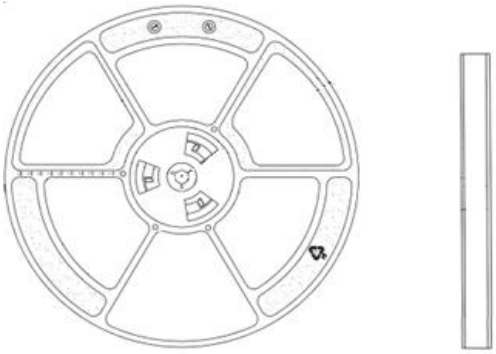
or



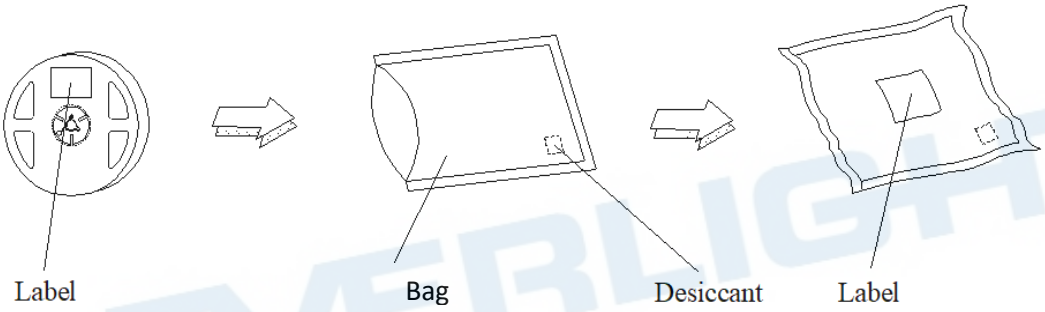
TUBE Dimension

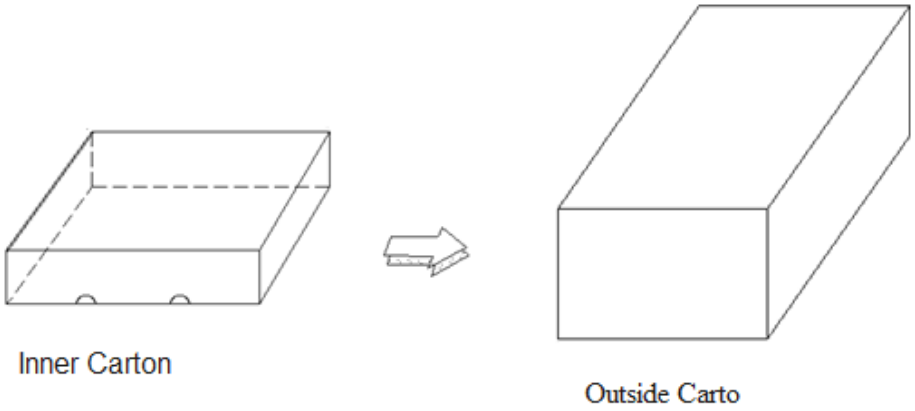


Reel Dimension



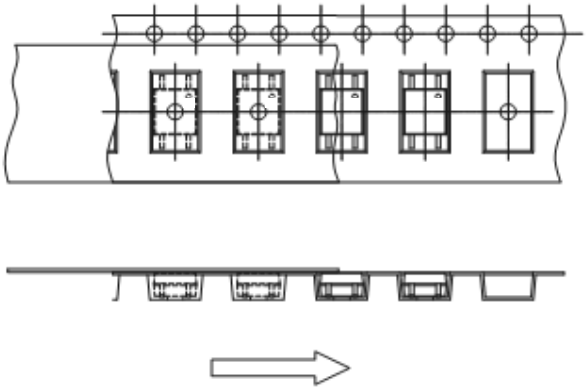
Moisture Resistant Packaging





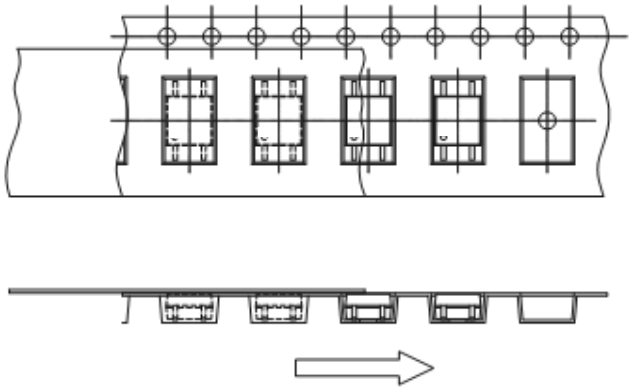
Tape & Reel Packing Specifications

Option TA



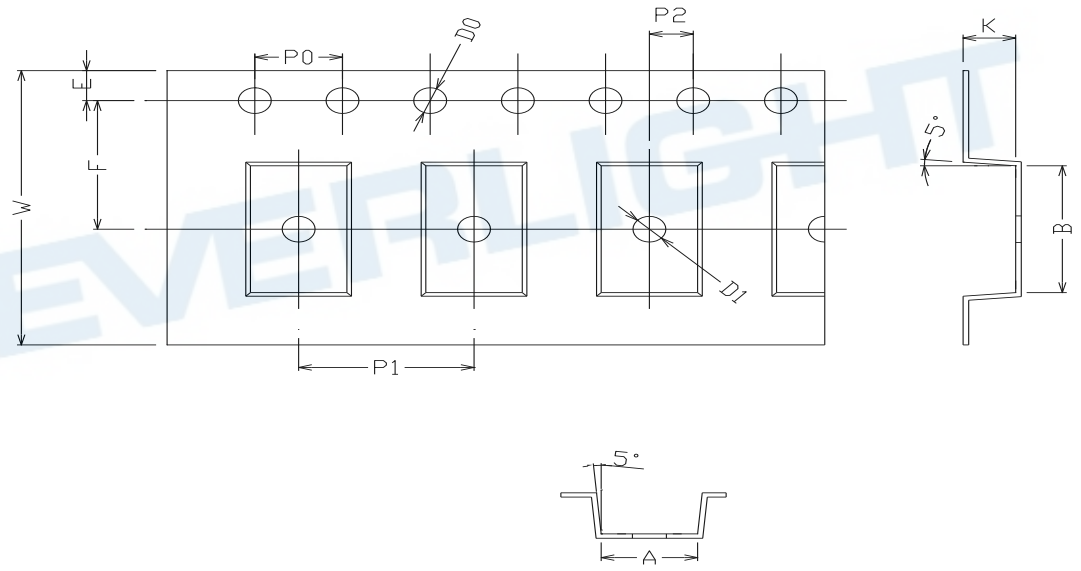
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions

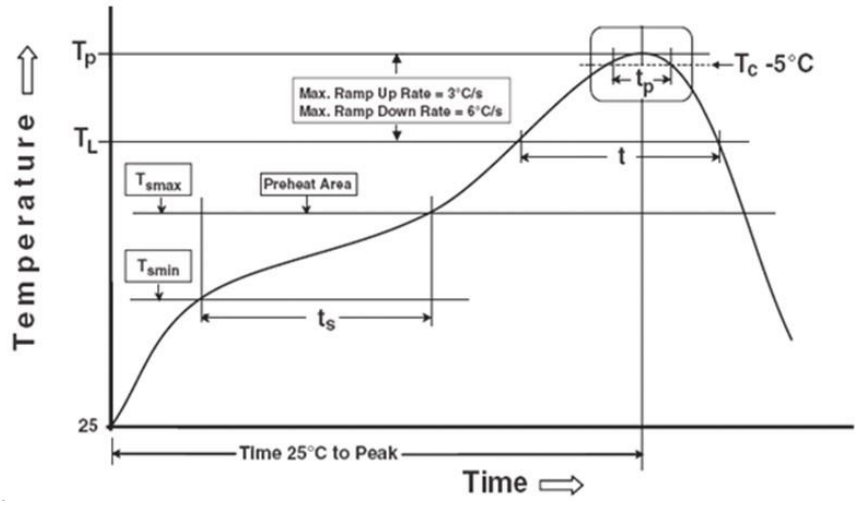


Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	4.4 ± 0.1	7.4 ± 0.1	1.5 + 0.1/-0	1.5 ± 0.1	1.75± 0.1	7.5 ± 0.05
Dimension No.	**Po**	**P1**	**P2**	**t**	**W**	**K**
Dimension (mm)	4.0 ± 0.15	8.0 ± 0.1	2.0 ± 0.1	0.25 ± 0.03	16.0 ± 0.2	2.4± 0.1

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

.

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.
4. These specification sheets include materials protected under copyright of EVERLIGHT. Reproduction in any form is prohibited without the specific consent of EVERLIGHT.
5. This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or life saving applications or any other application which can result in human injury or death. Please contact authorized Everlight sales agent for special application request.
6. Statements regarding the suitability of products for certain types of applications are based on Everlight's knowledge of typical requirements that are often placed on Everlight products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Everlight's terms and conditions of purchase, including but not limited to the warranty expressed therein.