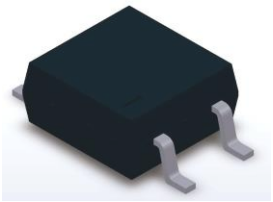
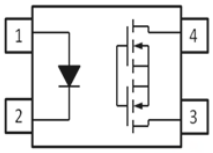
DATASHEET

4 PIN MINI FLAT PACKAGE SOLID STATE RELAY
ELM406A3-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 ELM406A3-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) *5*6

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	I_L	3	A
	Power Dissipation	P_{out}	500	mW
Total Power Dissipation		P_T	800	mW
Isolation Voltage*3		V_{iso}	3750	Vrms
Storage Temperature		T_{STG}	-40 to 110	°C
Operating Temperature		T_{OPR}	-40 to 85	°C
Soldering Temperature*4		T_{SOL}	260	°C

Notes:

*1. f =100Hz, Duty Cycle = 0.1%

*2. Indicate the peak AC and DC values

*3. 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.

*4. For 10 seconds

*5. In case in which a continual DC bias is applied between the input and output , the output-side MOSFET may deteriorate due to the voltage .Therefore ,please verify operation of the actual design before using.

*6 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. The absolute maximum Ratings are stress only T_A=25°C unless otherwise specified. Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum rating.

Recommended Operating Conditions (T_A=25℃)*7

Parameter	Symbol	Min.	Max.	Unit
Input current	I_F	8	20	mA
Load voltage	V_L	-	48	V
Continuous load current	I_L	-	1	A
Operating Temperature	T_{OPR}	-20	85	°C

*7 Please use under recommended operating conditions to obtain expected characteristics

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	-	-	10	μA
Output	Off State leakage Current	I_{leak}	I_F = 0mA, V_L = 48V.	-	-	1	μA
	On Resistance	$R_{d(ON)}$	I_F = 10mA, I_L = 1A. 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 = 1 A	-	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, V_L = 20V. 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

Figure 1. Load current vs Ambient temperature

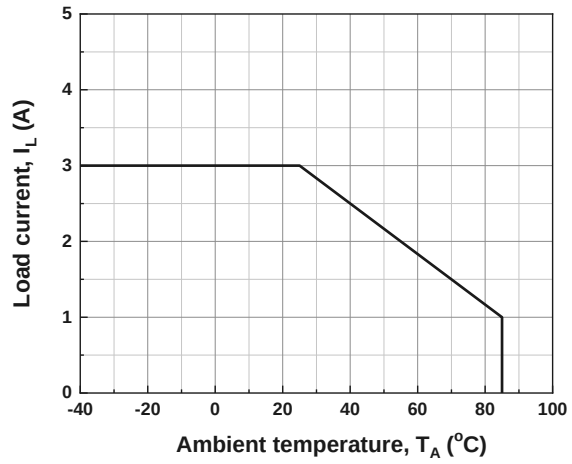


Figure 2. LED Forward Current vs Ambient Temperature

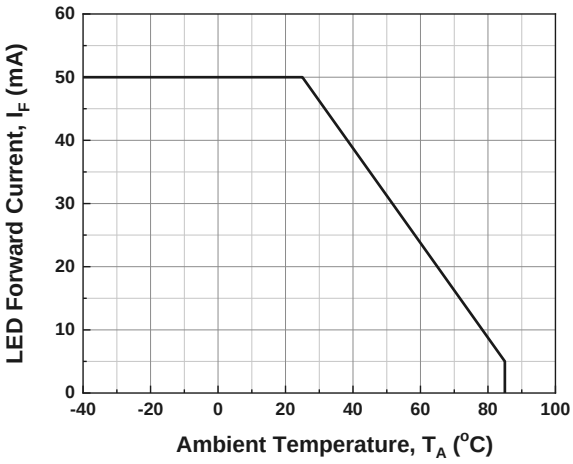


Figure 3. On Resistance vs Ambient Temperature

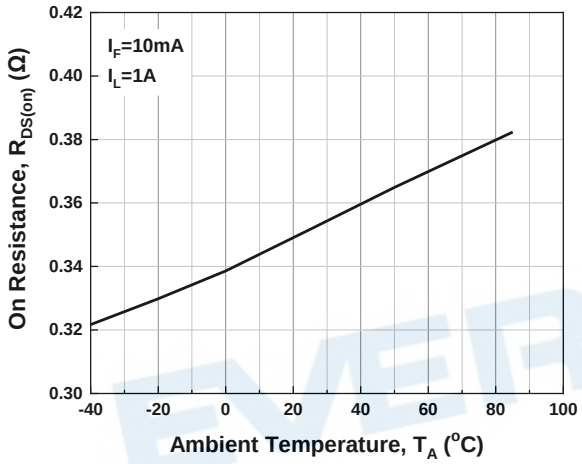


Figure 4. Normalized LED Operate On Current vs Ambient Temperature

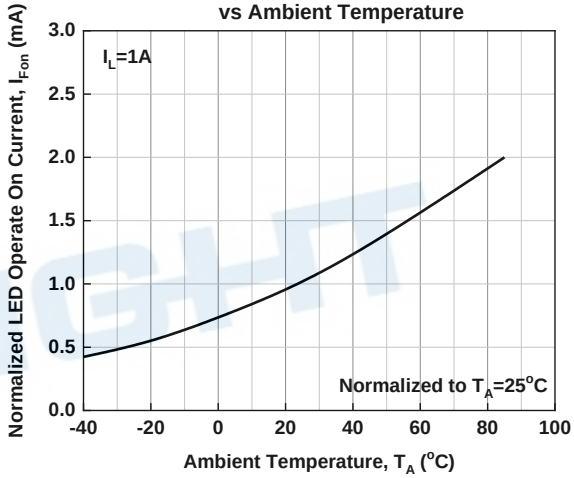


Figure 5. Switching Time vs Ambient Temperature

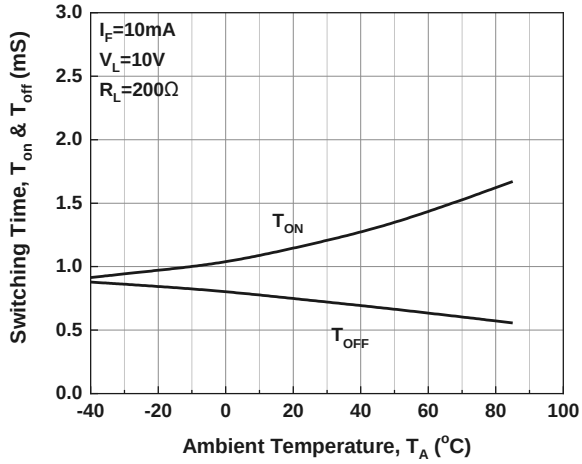


Figure 6. Switching Time vs LED Forward Current

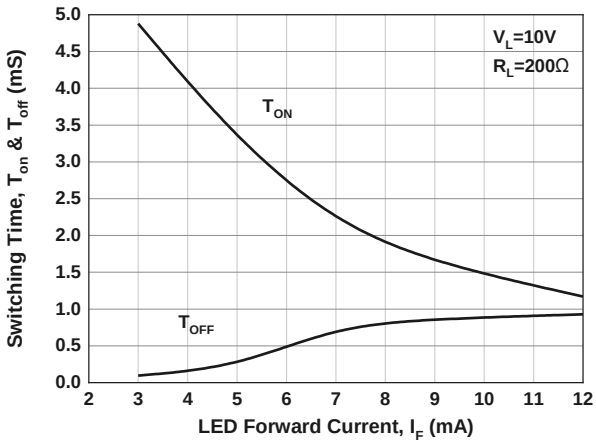


Figure 7. Load Voltage vs Load Current

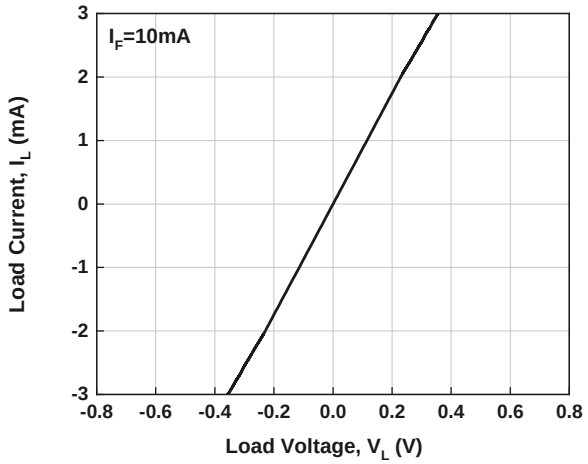


Figure 8. Input Forward Current vs Input Forward Voltage

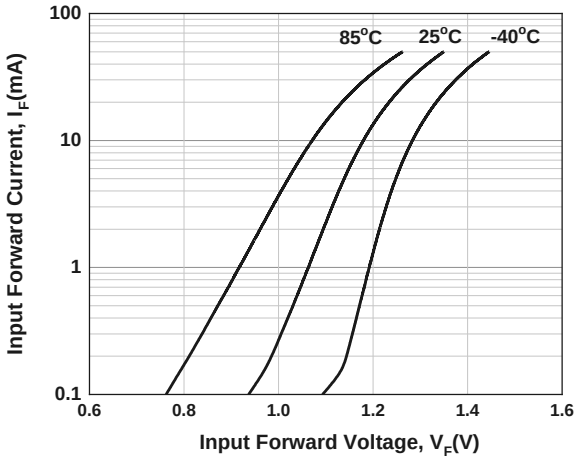
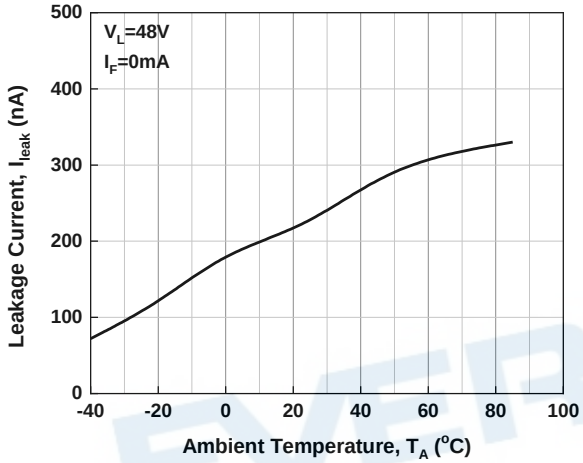
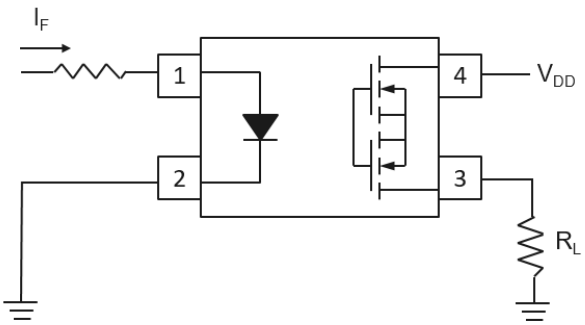


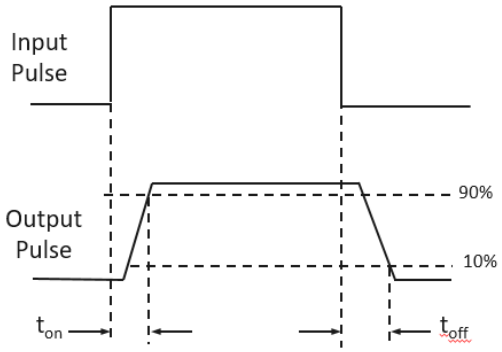
Figure 9. Leakage Current vs Ambient Temperature



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

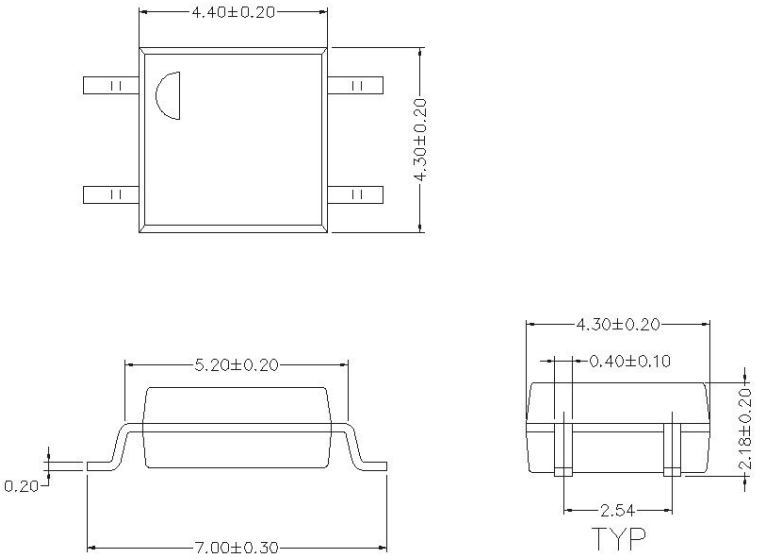
Part Number

ELM406A3(X)-VG

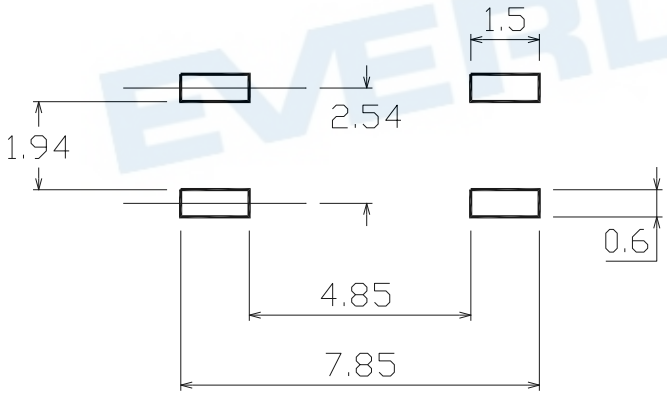
Note:
406A3 = Part No.
X = Tape and reel option (TA, TB or none)
V = VDE (optional)
G = Halogen free

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	3000 units per reel
(TB)	TB Tape & reel option	3000 units per reel
(TA)-V	TA Tape & reel option + VDE	3000 units per reel
(TB)-V	TB Tape & reel option + VDE	3000 units per reel

Package Dimension (Dimensions in mm)

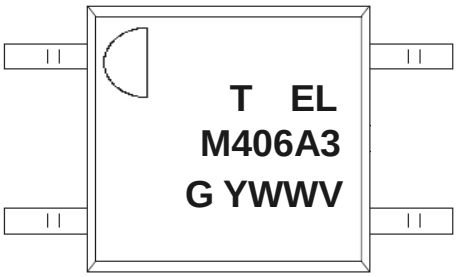


Recommended Pad Layout for Surface Mount Leadform



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

Device Marking

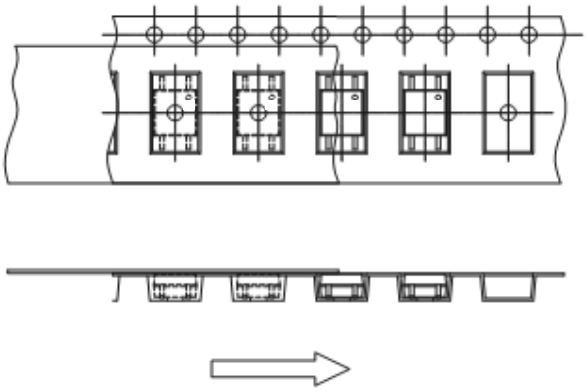


Notes

T	denotes Factory No code : made in China T : made in Taiwan
EL	denotes Everlight
M406A3	denotes Part Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE approved (optional)

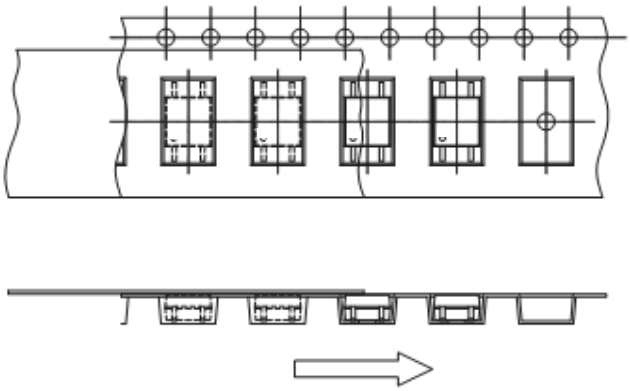
Tape & Reel Packing Specifications

Option TA



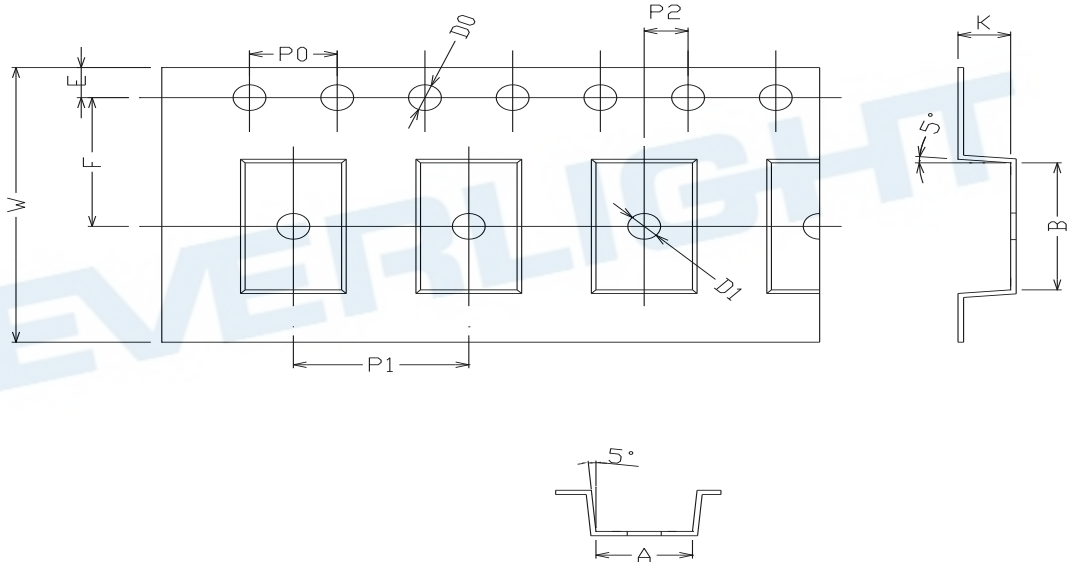
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions

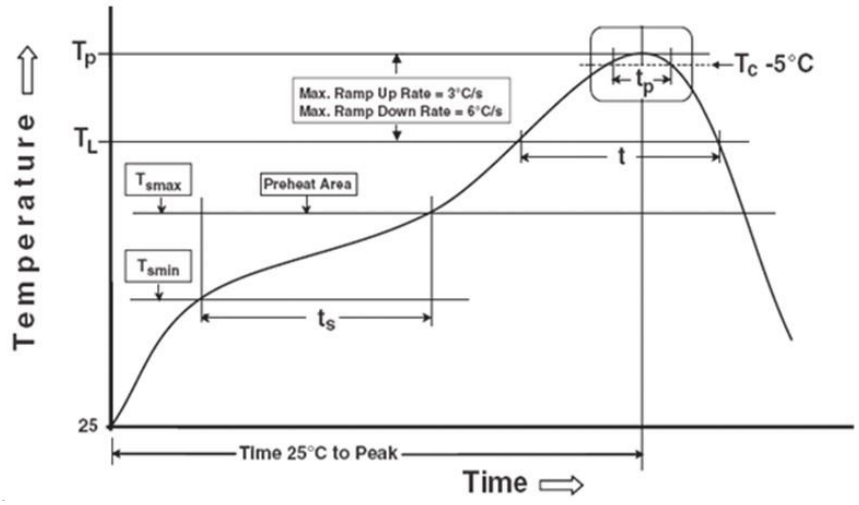


Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	4.4 ± 0.1	7.4 ± 0.1	1.5 + 0.1/-0	1.5 ± 0.1	1.75± 0.1	7.5 ± 0.05
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0 ± 0.15	8.0 ± 0.1	2.0 ± 0.1	0.25 ± 0.03	16.0 ± 0.2	2.4± 0.1

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

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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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