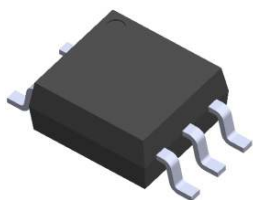


5 PIN SOP INTELLIGENT POWER MODULE PHOTOCOUPLER ELM456 series

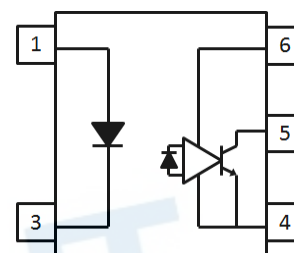
Preliminary



Features

- Compliance Halogen Free.
(Br <900 ppm, Cl <900 ppm, Br+Cl < 1500 ppm).
- Pb free and RoHS compliant
- Compliance with EU REACH.
- High isolation voltage between input and output
(Viso=3750 Vrms)
- UL and cUL approved (PENDING)
- VDE approved (PENDING)
- NEMKO approved (PENDING)
- FIMKO approved (PENDING)
- SEMKO approved (PENDING)
- DEMKO approved (PENDING)
- CQC approved (PENDING)

Schematic



0.1μF bypass capacitor must be connected between pins 6 and 4 *3

Pin Configuration

- 1: Anode
- 3: Cathode
- 4: GND
- 5: V_{out}
- 6: V_{cc}

Description

The ELM456 serie devices are consists of an infrared emitting diode optically coupled to a high gain photo detector. The devices are packaged in industry standard 5pin SOP packages and are suitable for surface mounting.

Applications

- IPM Isolation
- Isolated IGBT/MOSFET Gate Drive
- AC and Brushless DC Motor Drives
- Industrial Inverters

Absolute Maximum Ratings (Ta=25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I _F	20	mA
	Reverse voltage	V _R	5	V
	Power dissipation	P _D	40	mW
Output	Power dissipation	P _C	85	mW
	Output current	I _O	15	mA
	Output voltage	V _O	30	V
	Supply voltage	V _{CC}	30	V
Output Power Dissipation		P _O	100	mW
Isolation voltage ^{*1}		V _{ISO}	3750	V rms
Operating temperature		T _{OPR}	-40 ~ +85	°C
Storage temperature		T _{STG}	-55 ~ +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 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.

^{*2} For 10 seconds.

Electrical Characteristics

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	V_F	-	1.45	1.8	V	$I_F = 10\text{mA}$
Reverse Current	I_R	-	-	10	μA	$V_R = 5\text{V}$
Input capacitance	C_{IN}	-	60	-	pF	$V_F=0$, $f=1\text{MHz}$

Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
High Level supply current	I_{CCH}	-	0.7	1.5	mA	$I_F=0\text{mA}$, $V_{CC}=5\text{V}$
Low Level supply current	I_{CCL}	-	0.7	-	mA	$I_F=10\text{mA}$, $V_{CC}=5\text{V}$

Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Low Level Output Current	V_{OL}	-	0.15	0.6	V	$V_{CC} = 5\text{V}$, $I_F=5\text{mA}$, $I_O=2.4\text{mA}$
Input Threshold Current	I_{TH}	-	-	5	mA	$V_{CC}= 5.5\text{V}$, $V_O=0.6\text{V}$, $I_{OL}=13\text{mA}$
Low Level Output Current	I_{OL}		22		mA	$I_F=10\text{mA}$, $V_O=0.6\text{V}$, $V_{CC}=5\text{V}$
Current Transfer Ratio	CTR		220		%	$I_F=10\text{mA}$, $V_O=0.6\text{V}$, $V_{CC}=5\text{V}$

Switching Characteristics ($V_{CC}=5\text{V}$, $I_F=10\text{mA}$ unless specified otherwise)

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Propagation delay time to output High level	T_{PHL}	-	150	-	ns	$C_L = 10\text{pF}$, $R_L=350\Omega$,
Propagation delay time to output Low level	T_{PLH}	-	450	-	ns	$C_L = 10\text{pF}$, $R_L=350\Omega$,
Pulse width distortion	$ T_{PHL} - T_{PLH} $	-	300	-	ns	$C_L = 15\text{pF}$, $R_L=350\Omega$,

Switching Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Common Mode Transient Immunity at Logic High *4	CM _H	10		-	KV/μS	I _F = 0mA , V _{OH} =2.0V, R _L =350Ω, T _A =25°C V _{CM} =1000Vp-p
Common Mode Transient Immunity at Logic Low *5	CM _L	10	-	-	KV/μS	I _F = 7.5mA , V _{OL} =0.8V, R _L =350Ω, T _A =25°C V _{CM} =1000Vp-p

EVERLIGHT

Typical Electro-Optical Characteristics Curves

Figure 1. Output Current vs Forward current

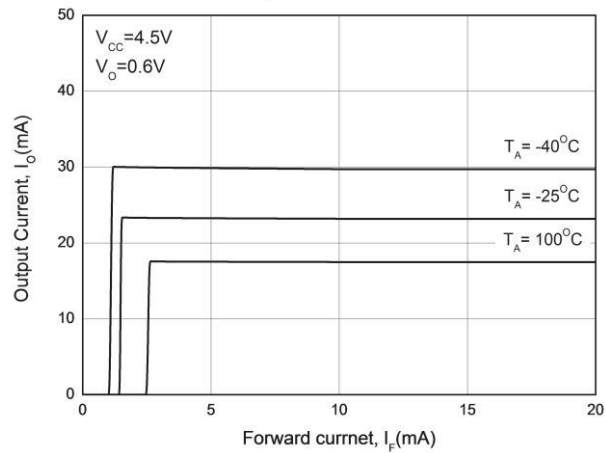


Figure 2. Normalized Output Current vs Temperature

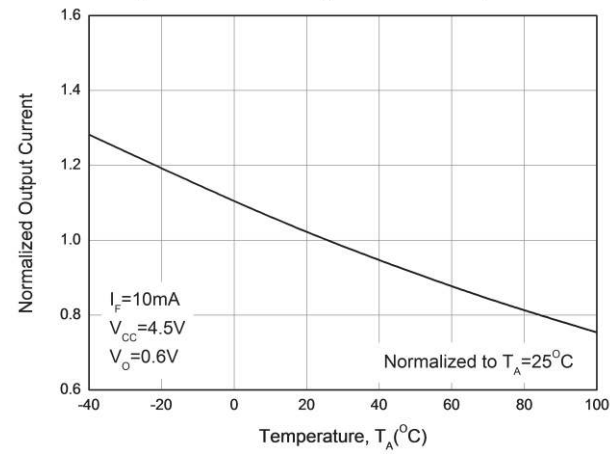


Figure 3. Propagation Delay vs Temperature

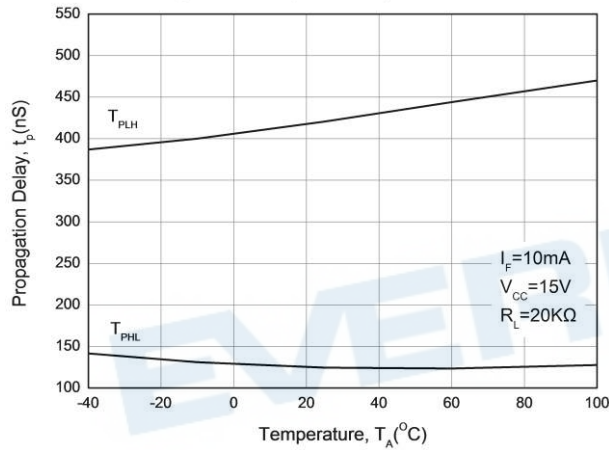


Figure 4. Propagation Delay vs Load Resistance

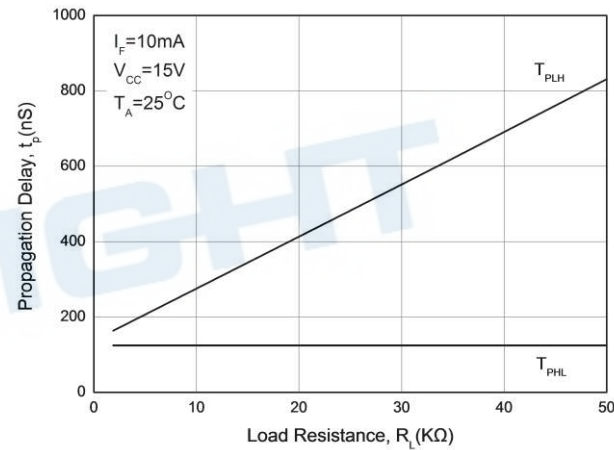


Figure 5. Propagation Delay vs Supply Voltage

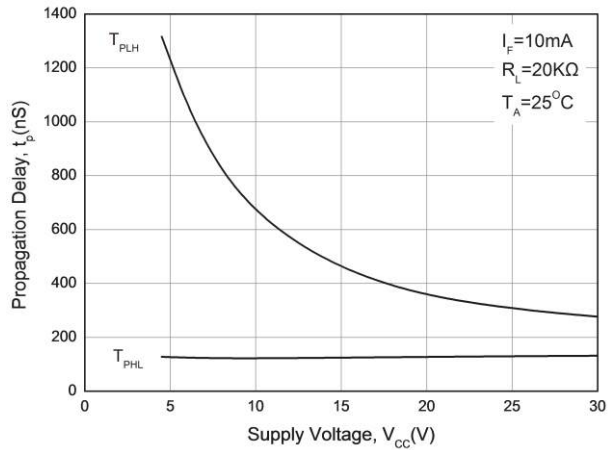
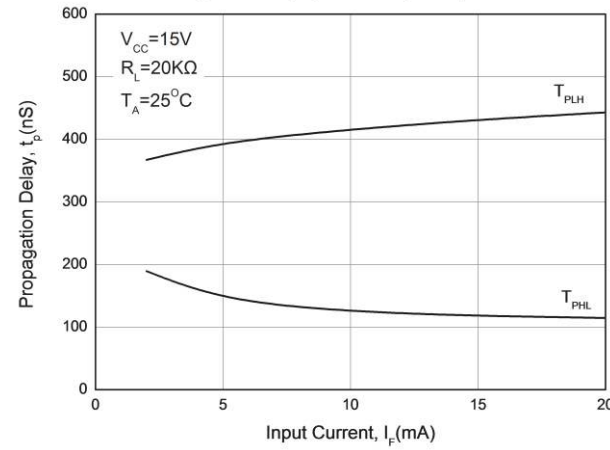


Figure 6. Propagation Delay vs Input Current



Order Information

Part Number

ELM456(Y)-VG

Note

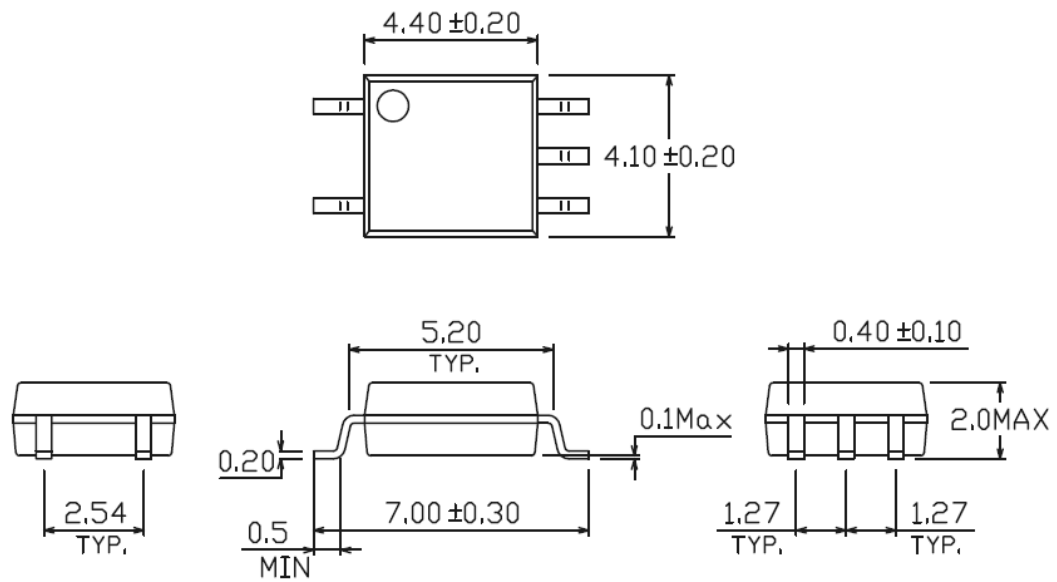
EL = denotes EVERLIGHT
M456 = part no.
Y = Tape and reel option (TA, TB)
V = VDE (optional)
G = Halogens free

Option	Description	Packing quantity
(TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
(TB)	Surface mount lead form + TB tape & reel option	1000 units per reel

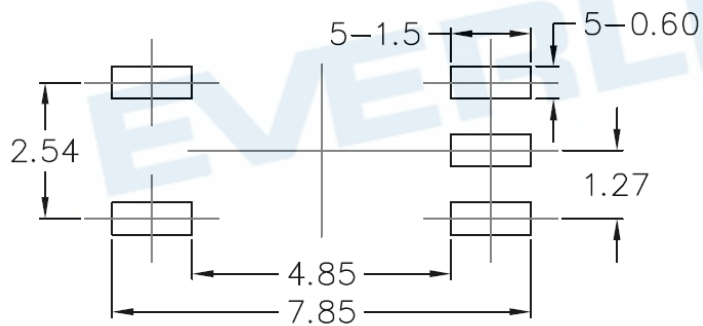
EVERLIGHT

Package Dimension

(Dimensions in mm)



Recommended pad layout for surface mount leadform



Device Marking



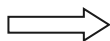
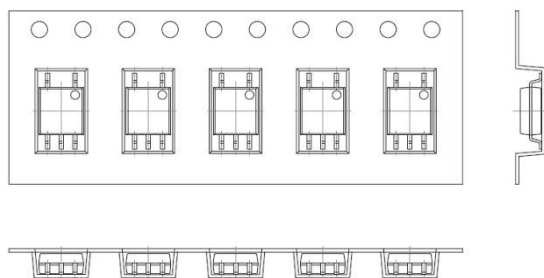
Notes

EL	denotes EVERLIGHT
M456	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

EVERLIGHT

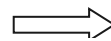
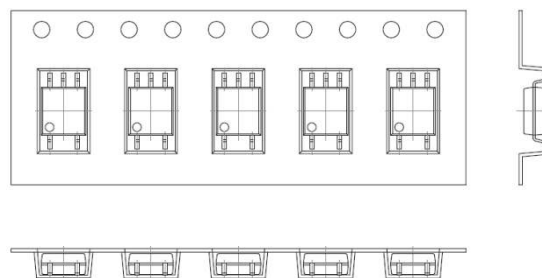
Tape & Reel Packing Specifications

Option TA



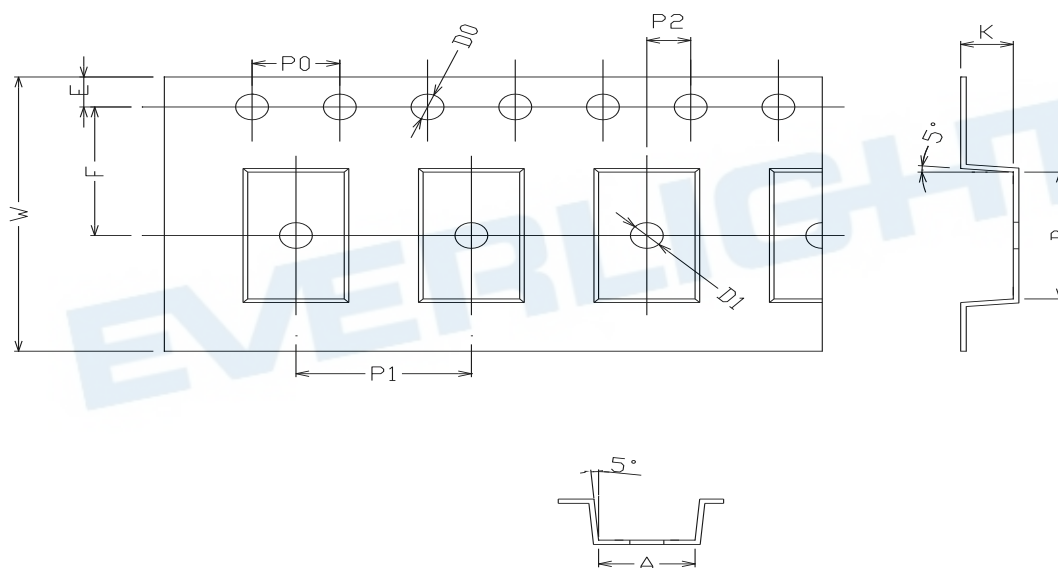
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions

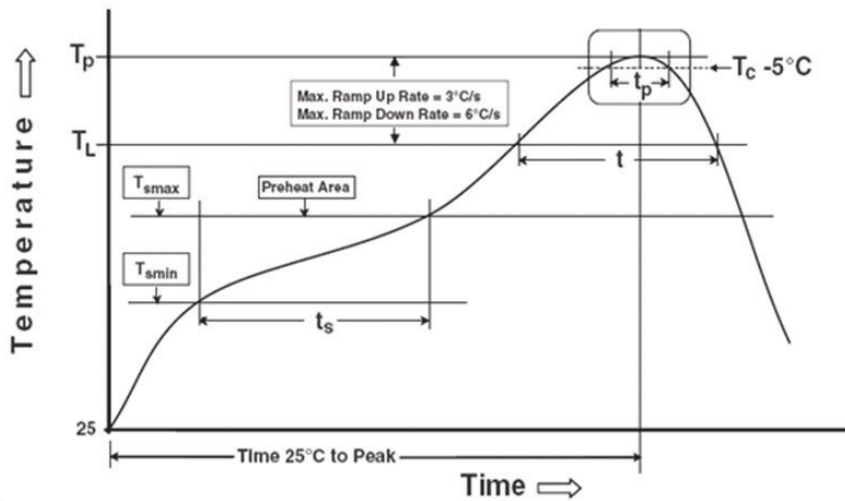


Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	4.4 ± 0.1	7.4 ± 0.1	$1.5 + 0.1/-0$	1.5 ± 0.1	1.75 ± 0.1	7.5 ± 0.05
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0 ± 0.15	8.0 ± 0.1	2.0 ± 0.1	0.25 ± 0.03	16.0 ± 0.2	2.4 ± 0.1

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: $T_P - 5^\circ\text{C}$	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

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.