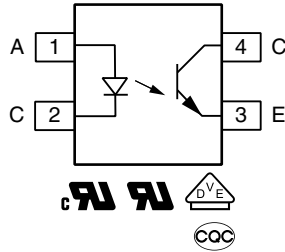


# Optocoupler, Phototransistor Output, Low Input Current, SOP-4, Mini-Flat Package



## DESIGN SUPPORT TOOLS AVAILABLE



## DESCRIPTION

The VOMA618A series has a GaAlAs infrared emitting diode, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 4-pin mini-flat package.

It features a high current transfer ratio at low input current, low coupling capacitance, and high isolation voltage.

The coupling device is designed for signal transmission between two electrically separated circuits, specifically for use in automotive, as well as high reliable industrial applications.

## FEATURES

- AEC-Q101 qualified
- High CTR with low input current
- Low power consumption
- SOP-4 low profile package
- High collector emitter voltage,  $V_{CE0} = 80\text{ V}$
- Isolation test voltage =  $3750 V_{RMS}$
- Low coupling capacitance
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

## APPLICATIONS

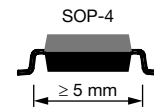
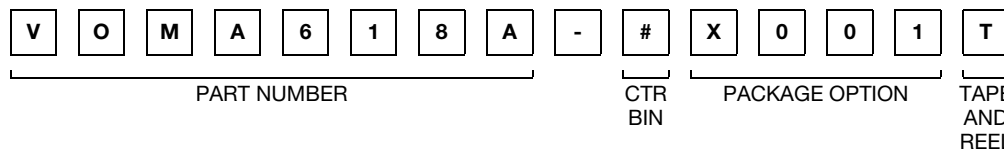
- Galvanic and noise isolation
- Signal transmission
- Hybrid / electric vehicle applications
- Battery management
- 48 V board net
- System control

## AGENCY APPROVALS

- UL1577
- cUL 1577
- DIN EN 60747-5-5 (VDE 0884-5)
- CQC GB4943.1-2011



## ORDERING INFORMATION



AGENCY CERTIFIED / PACKAGE	CTR (%)				
	1 mA				
UL, cUL, VDE, CQC	50 to 600	63 to 125	100 to 200	160 to 320	130 to 260
SOP-4	VOMA618A-X001T	VOMA618A-2X001T	VOMA618A-3X001T	VOMA618A-4X001T	VOMA618A-8X001T

### Note

- Additional options may be possible, please contact sales office



ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	5	V
Power dissipation		$P_{diss}$	30	mW
Forward current		$I_F$	20	mA
Surge forward current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	0.5	A
Junction temperature		$T_j$	125	$^{\circ}\text{C}$
<b>OUTPUT</b>				
Collector emitter voltage		$V_{CEO}$	80	V
Emitter collector voltage		$V_{ECO}$	7	V
Collector current		$I_C$	50	mA
Power dissipation		$P_{diss}$	150	mW
Junction temperature		$T_j$	125	$^{\circ}\text{C}$
<b>COUPLER</b>				
Total power dissipation		$P_{tot}$	180	mW
Storage temperature range		$T_{stg}$	-40 to +150	$^{\circ}\text{C}$
Ambient temperature range		$T_{amb}$	-40 to +110	$^{\circ}\text{C}$
Soldering temperature	$t = 10\text{ s}$	$T_{sld}$	260	$^{\circ}\text{C}$

Note

- 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

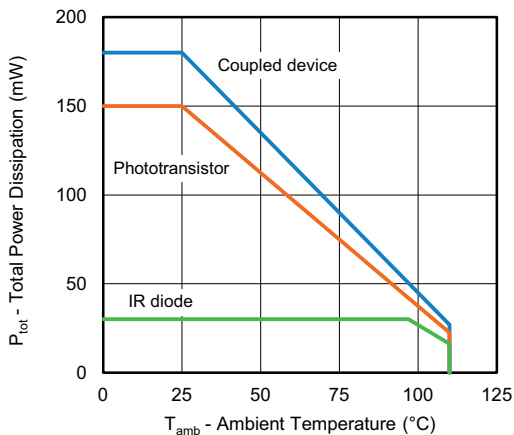


Fig. 1 - Power Dissipation vs. Ambient Temperature

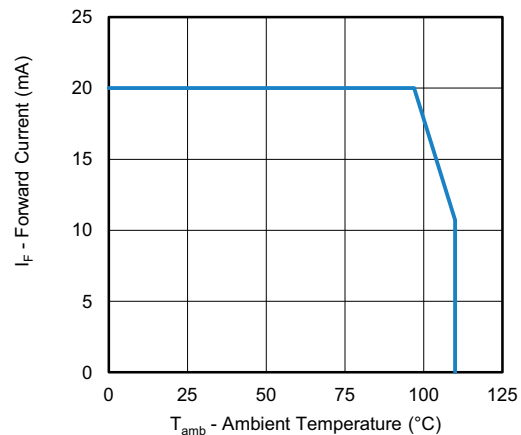


Fig. 2 - Maximum Forward Current vs. Ambient Temperature

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = 1\text{ mA}$	$V_F$	-	1.28	1.4	V
Reverse current	$V_R = 5\text{ V}$	$I_R$	-	-	10	$\mu\text{A}$
Capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$	$C_I$	-	40	-	pF
<b>OUTPUT</b>						
Collector emitter leakage current	$V_{CE} = 50\text{ V}$	$I_{CEO}$	-	1	100	nA
Collector emitter breakdown voltage	$I_C = 100\text{ }\mu\text{A}$	$BV_{CEO}$	80	-	-	V
Collector emitter capacitance	$V_{CE} = 5\text{ V}$ , $f = 1\text{ MHz}$	$C_{CE}$	-	7	-	pF
<b>COUPLER</b>						
Collector emitter saturation voltage	$I_F = 1\text{ mA}$ , $I_C = 0.25\text{ mA}$	$V_{CEsat}$	-	0.12	0.4	V
Cut-off frequency	$I_F = 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 100\text{ }\Omega$	$f_{CTR}$	-	155	-	kHz
Coupling capacitance	$f = 1\text{ MHz}$	$C_{IO}$	-	1.2	-	pF

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements

<b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$I_F = 1\text{ mA}$ , $V_{CE} = 5\text{ V}$	VOMA618A	CTR	50	-	600	%
		VOMA618A-2	CTR	63	-	125	%
		VOMA618A-3	CTR	100	-	200	%
		VOMA618A-4	CTR	160	-	320	%
		VOMA618A-8	CTR	130	-	260	%

<b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>NON-SATURATED</b>						
Rise time	$I_C = 2\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 100\text{ }\Omega$	$t_r$	-	1.8	-	$\mu\text{s}$
Fall time		$t_f$	-	1.7	-	$\mu\text{s}$
Turn-on time		$t_{on}$	-	6.8	-	$\mu\text{s}$
Turn-off time		$t_{off}$	-	2.3	-	$\mu\text{s}$
<b>SATURATED</b>						
Rise time	$I_F = 1\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 1.9\text{ k}\Omega$	$t_r$	-	5.4	-	$\mu\text{s}$
Fall time		$t_f$	-	5.8	-	$\mu\text{s}$
Turn-on time		$t_{on}$	-	10.0	-	$\mu\text{s}$
Turn-off time		$t_{off}$	-	6.6	-	$\mu\text{s}$

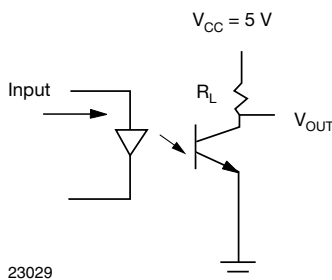


Fig. 3 - Test Circuit for Switching Characteristics

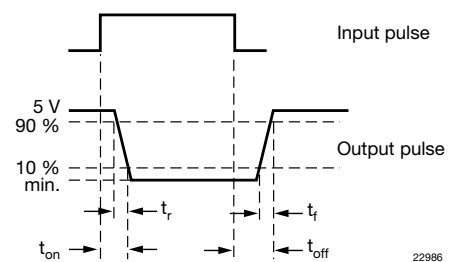


Fig. 4 - Parameter and Limit Definition

SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		40 / 110 / 21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group IIIa	CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, t = 1 min	$V_{ISO}$	3750	$V_{RMS}$
Maximum transient isolation voltage	According to DIN EN 60747-5-5	$V_{IOTM}$	6000	$V_{peak}$
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	$V_{IORM}$	707	$V_{peak}$
Isolation resistance	$T_{amb} = 25\text{ }^{\circ}\text{C}, V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$T_{amb} = 100\text{ }^{\circ}\text{C}, V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
	$T_{amb} = T_S, V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^9$	$\Omega$
Output safety power		$P_{SO}$	550	mW
Input safety current		$I_{SI}$	180	mA
Input safety temperature		$T_S$	175	$^{\circ}\text{C}$
Creepage distance			$\geq 5$	mm
Clearance distance			$\geq 5$	mm

**Note**

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits

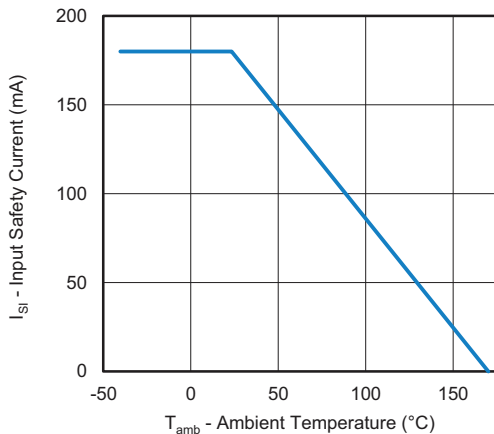


Fig. 5 - Input Safety Current vs. Ambient Temperature

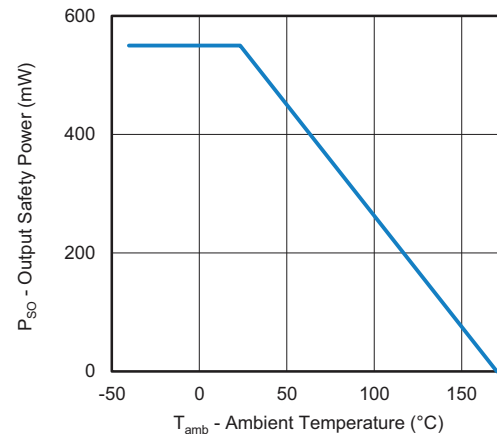


Fig. 6 - Output Safety Power vs. Ambient Temperature

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

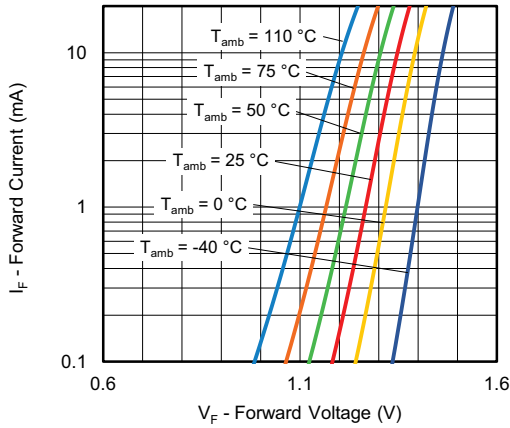


Fig. 7 - Forward Current vs. Forward Voltage

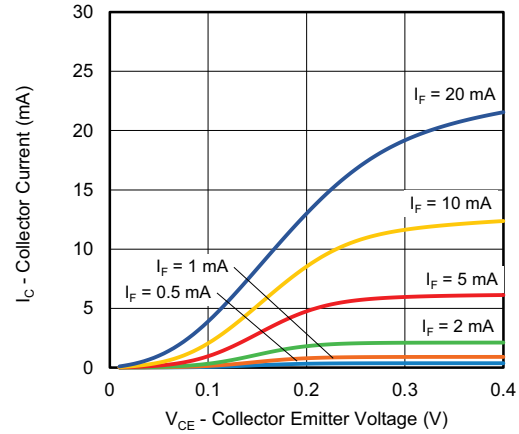


Fig. 10 - Collector Current vs. Collector Emitter Voltage (sat.)

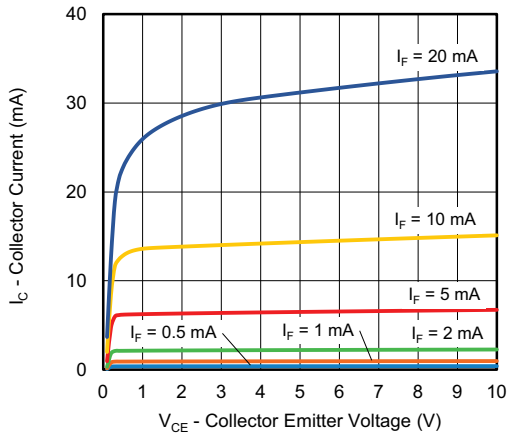


Fig. 8 - Collector Current vs. Collector Emitter Voltage (non-sat.)

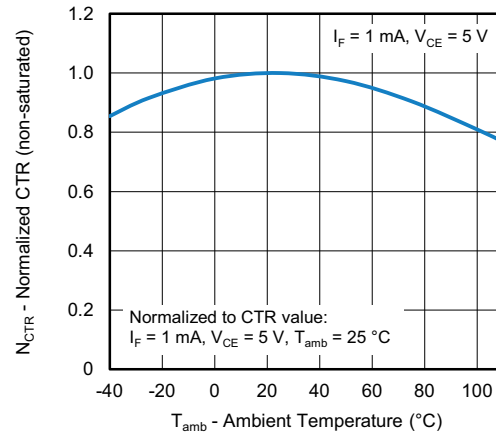


Fig. 11 - Normalized CTR (non-sat.) vs. Ambient Temperature

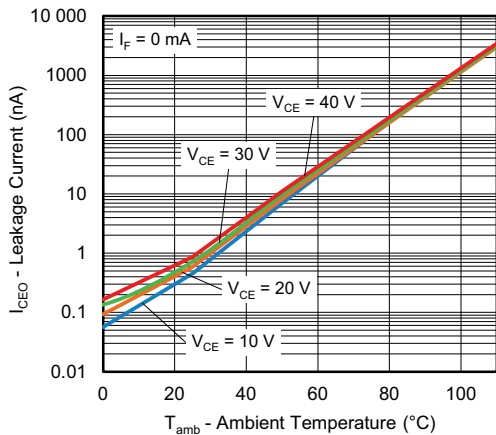


Fig. 9 - Leakage Current vs. Ambient Temperature

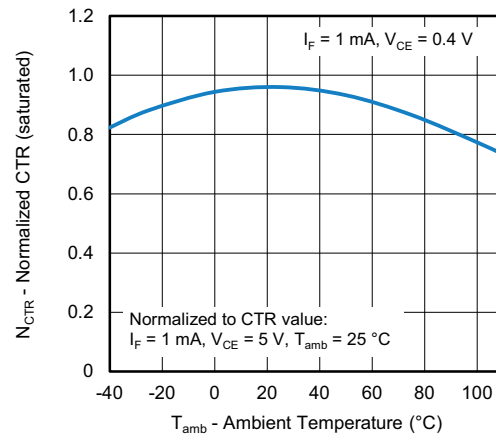


Fig. 12 - Normalized CTR (sat.) vs. Ambient Temperature

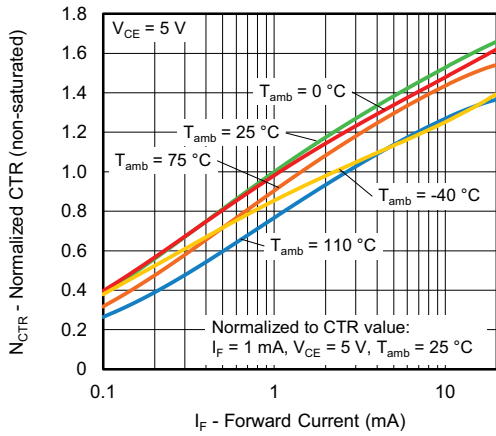


Fig. 13 - Normalized CTR (non-sat.) vs. Forward Current

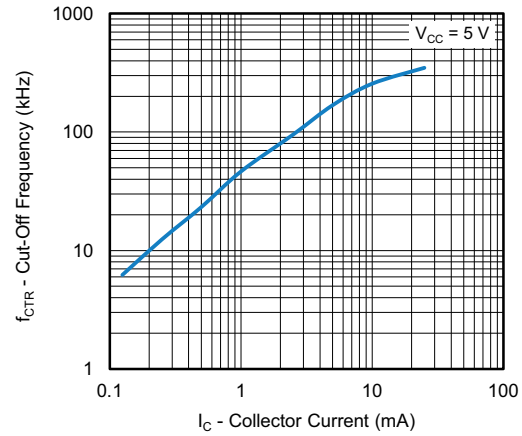


Fig. 16 - Cut-Off Frequency vs. Collector Current

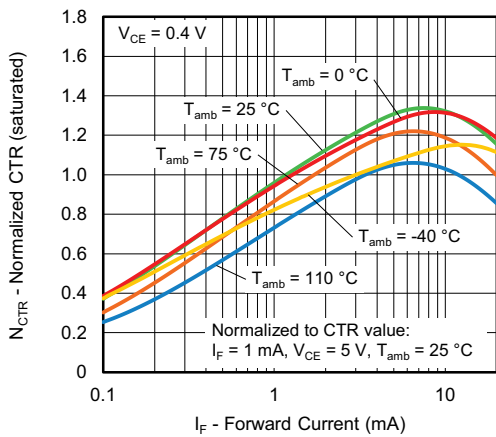


Fig. 14 - Normalized CTR (sat.) vs. Forward Current

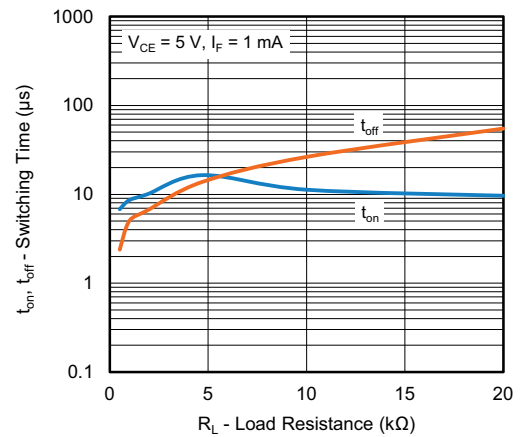


Fig. 17 - Switching Time vs. Load Resistance

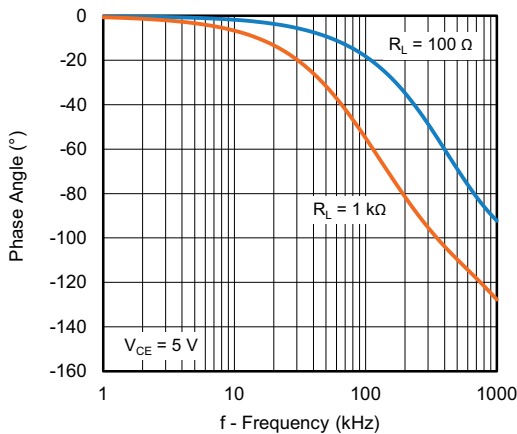


Fig. 15 - Phase Angle vs. Frequency

**PACKAGE DIMENSIONS** (in millimeters)

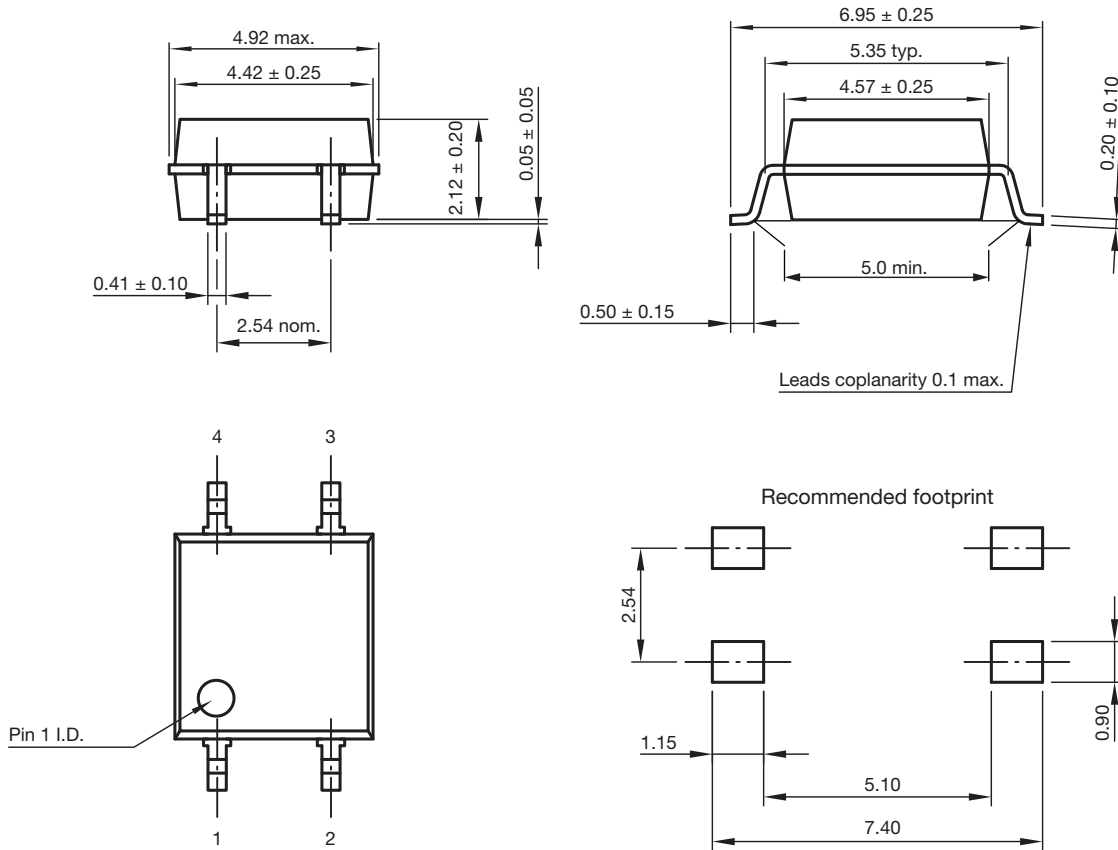


Fig. 18 - Package Drawing

**PACKAGE MARKING**

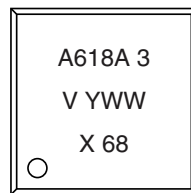


Fig. 19 - Example of VOMA618A-3X001T

**Note**

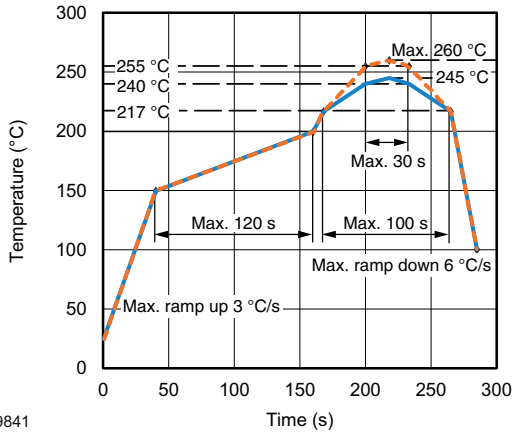
- Tape and reel suffix (T) is not part of the package marking







**SOLDER PROFILES**



19841

Fig. 22 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD Devices

**HANDLING AND STORAGE CONDITIONS**

ESD level: HBM class 2

**DRYPACK**

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

**FLOOR LIFE**

Floor life (time between soldering and removing from MBB) must not exceed the time indicated on MBB label:

Floor life: 168 h

Conditions:  $T_{amb} < 30\text{ }^{\circ}\text{C}$ ,  $\text{RH} < 60\%$

Moisture sensitivity level 3, according to J-STD-020.

**DRYING**

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-033D.



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