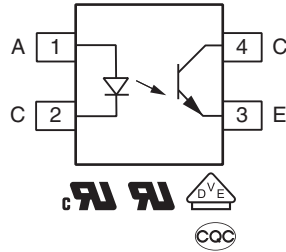


Optocoupler, Phototransistor Output, Low Input Current, SOP-4, Mini-Flat Package



DESCRIPTION

The VOMA617A 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 devices are 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
- SOP-4 low profile package
- High collector emitter voltage, $V_{CE0} = 80\text{ V}$
- Isolation test voltage = $3750\text{ V}_{\text{RMS}}$
- Low coupling capacitance
- Material categorization: for definitions of compliance please see 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 (pending)



ORDERING INFORMATION

<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">V</div> <div style="border: 1px solid black; padding: 2px;">O</div> <div style="border: 1px solid black; padding: 2px;">M</div> <div style="border: 1px solid black; padding: 2px;">A</div> <div style="border: 1px solid black; padding: 2px;">6</div> <div style="border: 1px solid black; padding: 2px;">1</div> <div style="border: 1px solid black; padding: 2px;">7</div> <div style="border: 1px solid black; padding: 2px;">A</div> <div style="border: 1px solid black; padding: 2px;">-</div> <div style="border: 1px solid black; padding: 2px;">#</div> <div style="border: 1px solid black; padding: 2px;">X</div> <div style="border: 1px solid black; padding: 2px;">0</div> <div style="border: 1px solid black; padding: 2px;">0</div> <div style="border: 1px solid black; padding: 2px;">1</div> <div style="border: 1px solid black; padding: 2px;">T</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="text-align: center;">PART NUMBER</div> <div style="text-align: center;">CTR BIN</div> <div style="text-align: center;">PACKAGE OPTION</div> <div style="text-align: center;">TAPE AND REEL</div> <div style="text-align: center;"> </div> </div>													
AGENCY CERTIFIED / PACKAGE	CTR (%)												
	5 mA												
UL, cUL, VDE, CQC	50 to 600	100 to 200											
SOP-4	VOMA617A-X001T	VOMA617A-3X001T											

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
INPUT				
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	$^{\circ}\text{C}$
OUTPUT				
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	$^{\circ}\text{C}$
COUPLER				
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_{slid}	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

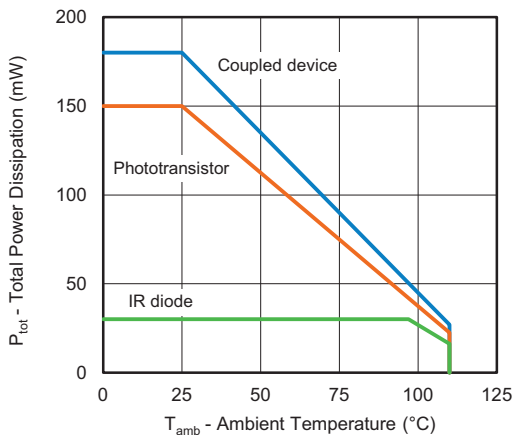


Fig. 1 - Power Dissipation vs. Ambient Temperature

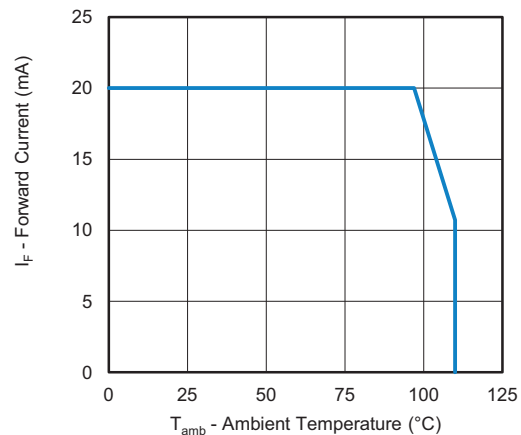


Fig. 2 - Maximum Forward Current vs. Ambient Temperature

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward voltage	$I_F = 5\text{ mA}$	V_F	-	1.33	1.5	V
Reverse current	$V_R = 5\text{ V}$	I_R	-	-	10	μA
Capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$	C_I	-	40	-	pF
OUTPUT						
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
COUPLER						
Collector emitter saturation voltage	$I_F = 5\text{ mA}$, $I_C = 1.25\text{ mA}$	V_{CEsat}	-	0.25	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

CURRENT TRANSFER RATIO ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
I_C/I_F	$I_F = 5\text{ mA}$, $V_{CE} = 5\text{ V}$	VOMA617A	CTR	50	-	600	%
		VOMA617A-3	CTR	100	-	200	%

SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
NON-SATURATED						
Rise time	$I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 100\text{ }\Omega$	t_r	-	2.3	-	μs
Fall time		t_f	-	3.2	-	μs
Turn-on time		t_{on}	-	4.9	-	μs
Turn-off time		t_{off}	-	3.3	-	μs
SATURATED						
Rise time	$I_F = 5\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1.9\text{ k}\Omega$	t_r	-	1.1	-	μs
Fall time		t_f	-	6.2	-	μs
Turn-on time		t_{on}	-	2.0	-	μs
Turn-off time		t_{off}	-	10.6	-	μs

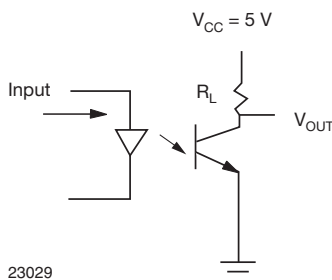


Fig. 3 - Test Circuit for Switching Characteristics

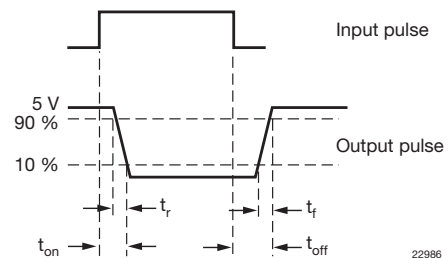


Fig. 4 - Parameter and Limit Definition

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}	$\geq 10^{12}$	Ω
	$T_{amb} = 100\text{ }^{\circ}\text{C}, V_{IO} = 500\text{ V}$	R_{IO}	$\geq 10^{11}$	Ω
	$T_{amb} = T_S, V_{IO} = 500\text{ V}$	R_{IO}	$\geq 10^9$	Ω
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			≥ 5	mm
Clearance distance			≥ 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

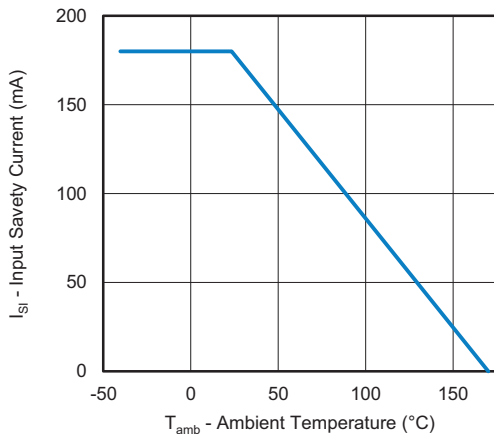


Fig. 5 - Input Safety Current vs. Ambient Temperature

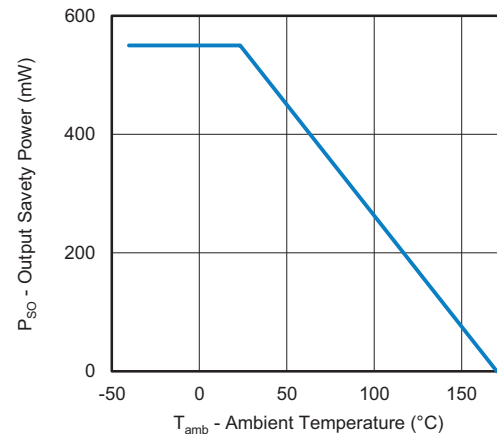


Fig. 6 - Output Safety Power vs. Ambient Temperature

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

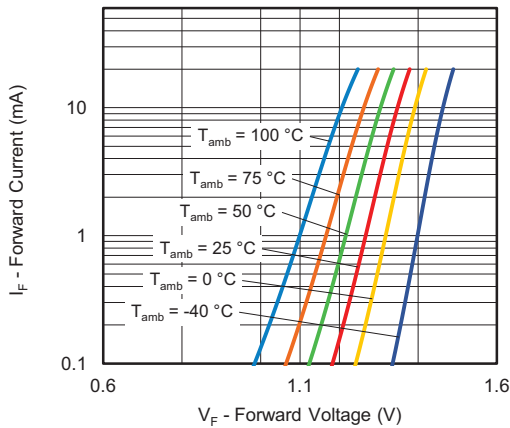


Fig. 7 - Forward Current vs. Forward Voltage

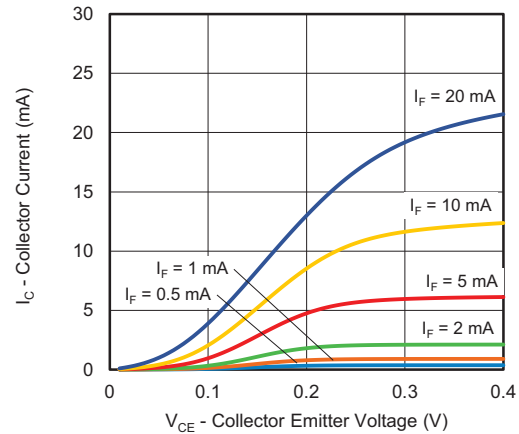


Fig. 10 - Collector Current vs. Collector Emitter Voltage (sat.)

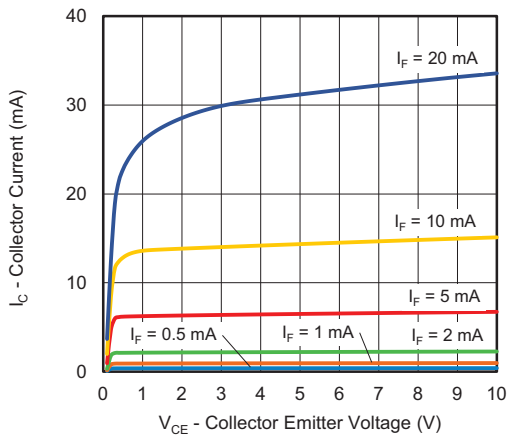


Fig. 8 - Collector Current vs. Collector Emitter Voltage (non-sat.)

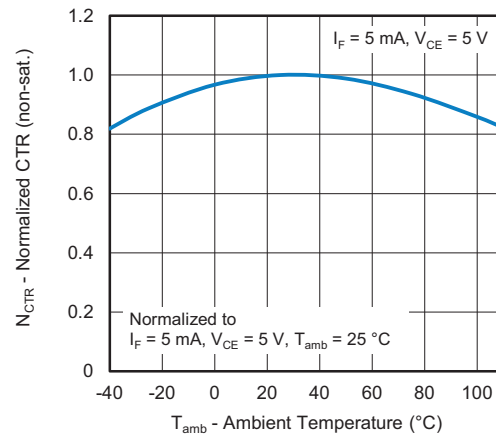


Fig. 11 - Normalized CTR (non-sat.) vs. Ambient Temperature

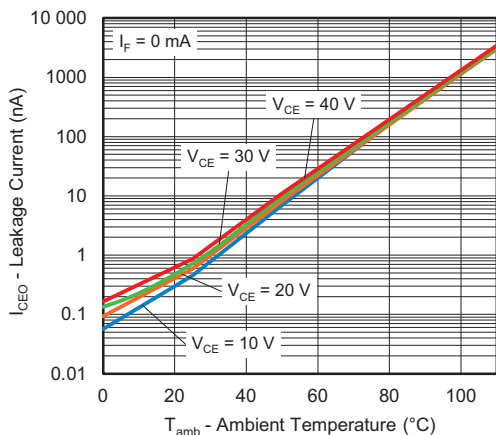


Fig. 9 - Leakage Current vs. Ambient Temperature

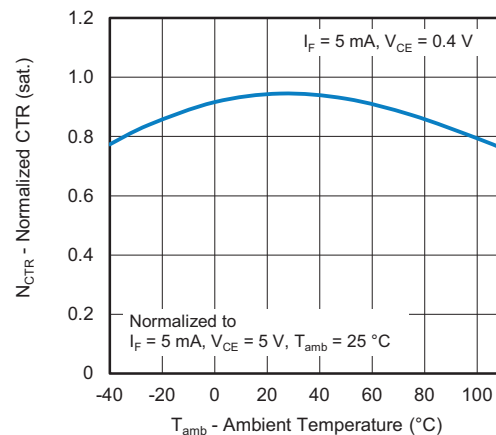


Fig. 12 - Normalized CTR (sat.) vs. Ambient Temperature

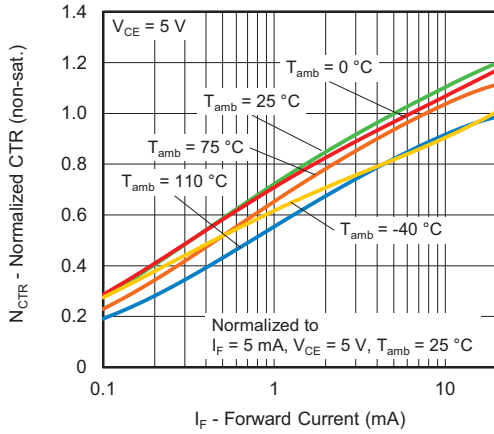


Fig. 13 - Normalized CTR (non-sat.) vs. Forward Current

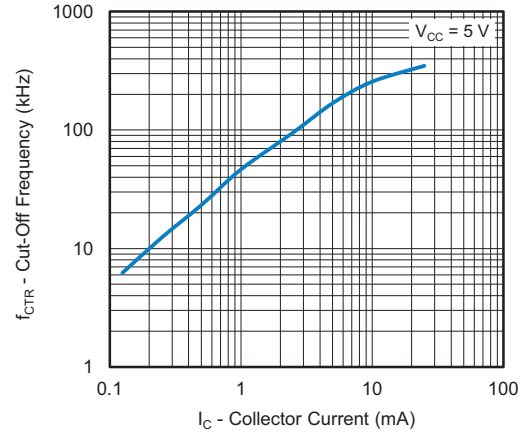


Fig. 16 - Cut-Off Frequency vs. Collector Current

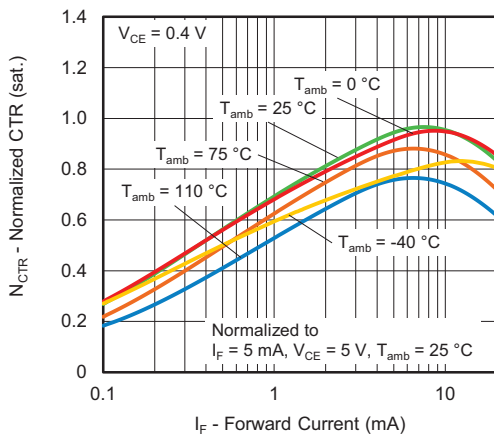


Fig. 14 - Normalized CTR (sat.) vs. Forward Current

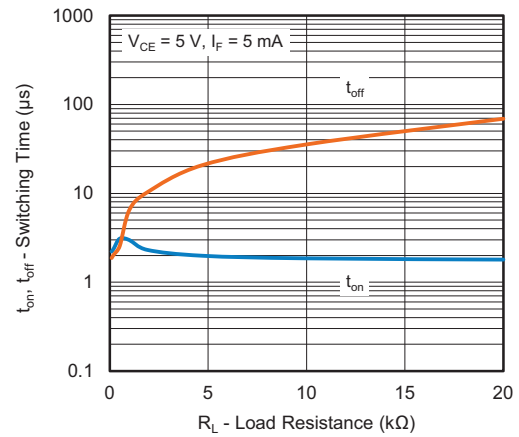


Fig. 17 - Switching Time vs. Load Resistance

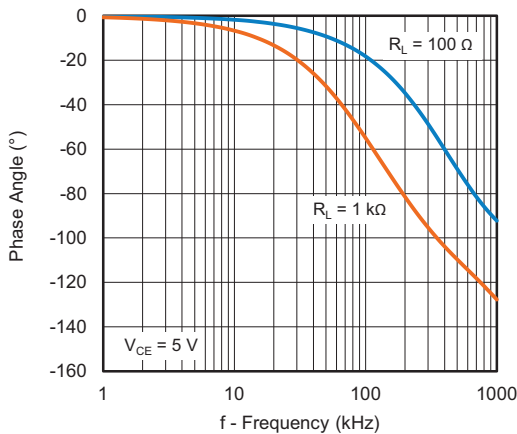


Fig. 15 - Phase Angle vs. Frequency

PACKAGE DIMENSIONS (in millimeters)

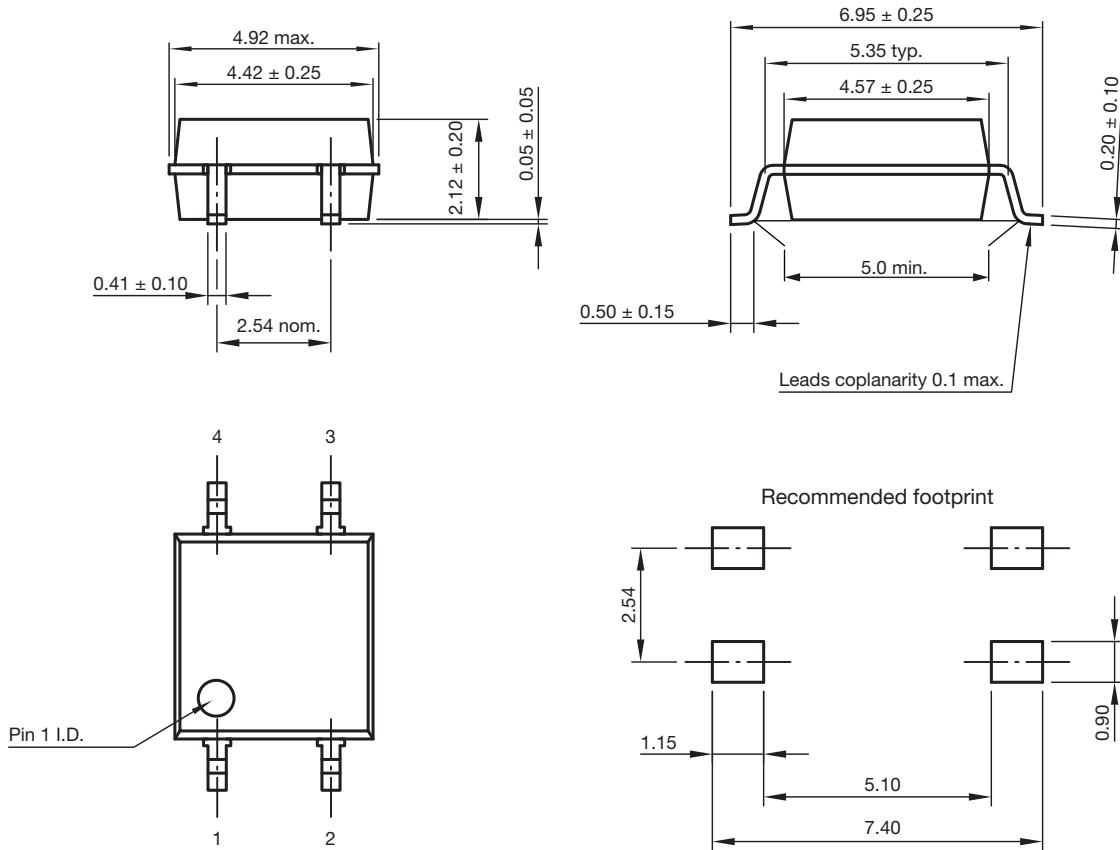
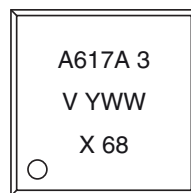


Fig. 18 - Package Drawing

PACKAGE MARKING (example of VOMA617A-3X001T)



Notes

- Option 1 is reflected with letter "X"
- Tape and reel suffix (T) is not part of the package marking

PACKAGING INFORMATION (in millimeters)

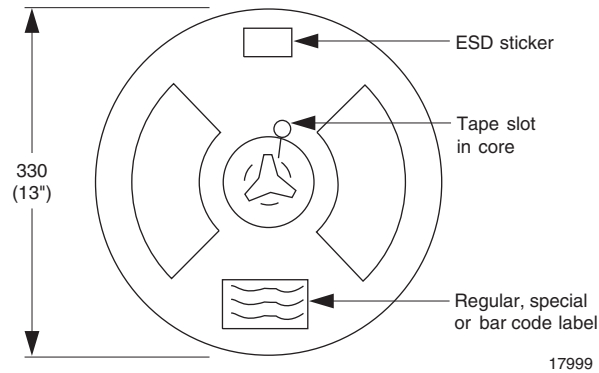
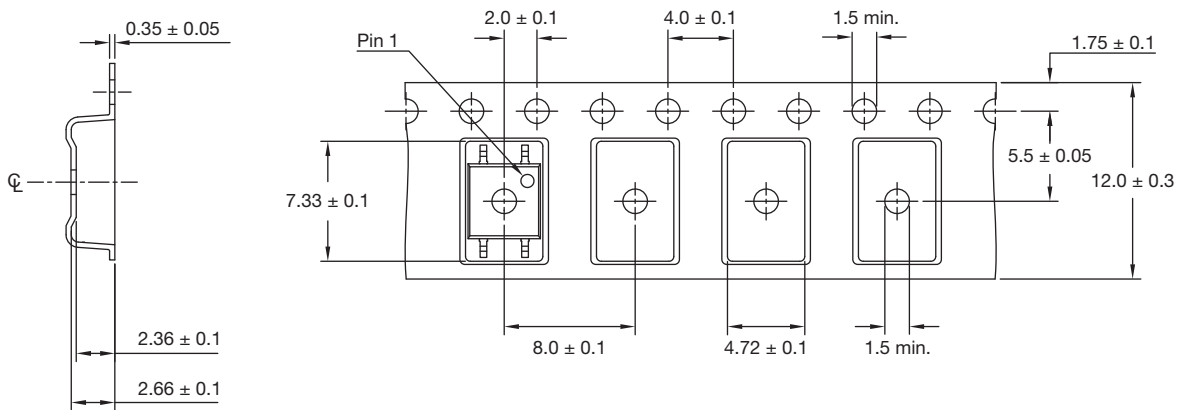


Fig. 19 - Tape and Reel Shipping Medium (EIA-481, revision A, and IEC 60286)



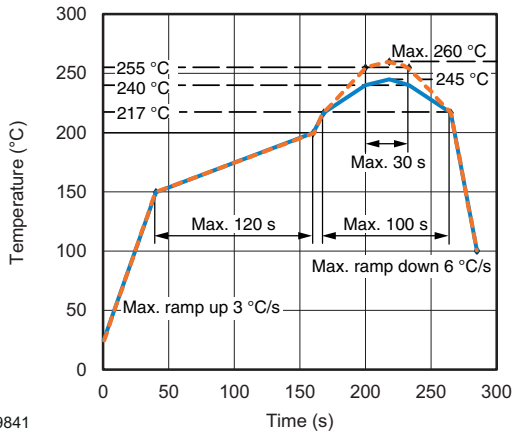
Note
 • Cummulative tolerance of 10 spocket holes is 0.20 mm

Fig. 20 - Tape and Reel Packing

TAPE AND REEL PACKING	
TYPE	UNITS/REEL
SOP-4	2000



SOLDER PROFILES



19841

Fig. 21 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: 168 h

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

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



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