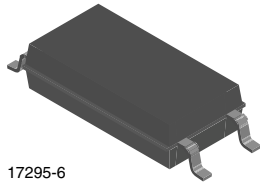




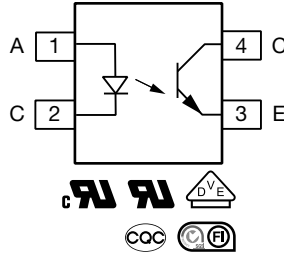
THE DATASHEET OF VOL618AT



Optocoupler, Phototransistor Output, Low Input Current, 4 Pin LSOP, Long Creepage Mini-Flat Package



17295-6


FEATURES

- Low profile package
- High collector emitter voltage, $V_{CE0} = 80\text{ V}$
- Isolation test voltage, 5000 V_{RMS}
- Isolation voltage $V_{IORM} = 1050\text{ V}_{peak}$
- Low coupling capacitance
- High common mode transient immunity
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912


LINKS TO ADDITIONAL RESOURCES

DESCRIPTION

The VOL618A has a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 4 pin LSOP wide body package.

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

The coupling device is designed for signal transmission between two electrically separated circuits.

APPLICATIONS

- Telecom
- Industrial controls
- Battery powered equipment
- Office machines
- Programmable controllers

AGENCY APPROVALS

(All parts are certified under base model VOL618A)

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\), available with option 1](#)
- [BSI](#)
- [FIMKO](#)
- [CQC](#)

ORDERING INFORMATION																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">V</td> <td style="text-align: center;">O</td> <td style="text-align: center;">L</td> <td style="text-align: center;">6</td> <td style="text-align: center;">1</td> <td style="text-align: center;">8</td> <td style="text-align: center;">A</td> <td style="text-align: center;">-</td> <td style="text-align: center;">#</td> <td style="text-align: center;">X</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">T</td> </tr> <tr> <td colspan="8" style="text-align: center;">PART NUMBER</td> <td style="text-align: center;">CTR BIN</td> <td colspan="3" style="text-align: center;">PACKAGE OPTION</td> <td style="text-align: center;">TAPE AND REEL</td> </tr> </table>	V	O	L	6	1	8	A	-	#	X	0	0	1	T	PART NUMBER								CTR BIN	PACKAGE OPTION			TAPE AND REEL			
V	O	L	6	1	8	A	-	#	X	0	0	1	T																	
PART NUMBER								CTR BIN	PACKAGE OPTION			TAPE AND REEL																		
AGENCY CERTIFIED/PACKAGE	CTR (%)																													
	1 mA																													
UL, cUL, BSI, FIMKO, CQC	50 to 600	63 to 125	100 to 200																											
4 pin LSOP, mini-flat, long creepage	VOL618AT	VOL618A-2T	VOL618A-3T																											
UL, cUL, BSI, FIMKO, CQC, VDE (option 1)	50 to 600	63 to 125	100 to 200																											
4 pin LSOP, mini-flat, long creepage	-	VOL618A-2X001T	VOL618A-3X001T																											

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_R	6	V
Power dissipation		P_{diss}	100	mW
Forward current		I_F	60	mA
Forward surge current	$t_p < 10\text{ }\mu\text{s}$	I_{FSM}	1.5	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
	$t_p/T = 0.5, t_p < 10\text{ ms}$	I_C	100	mA
Power dissipation		P_{diss}	150	mW
Junction temperature		T_j	125	$^{\circ}\text{C}$
COUPLER				
Total power dissipation		P_{tot}	250	mW
Storage temperature range		T_{stg}	-55 to +125	$^{\circ}\text{C}$
Ambient temperature range		T_{amb}	-55 to +110	$^{\circ}\text{C}$
Soldering temperature ⁽¹⁾	$\leq 10\text{ s}$	T_{sld}	260	$^{\circ}\text{C}$

Notes

- 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.
- ⁽¹⁾ Refer to reflow profile for soldering conditions for surface mounted devices.

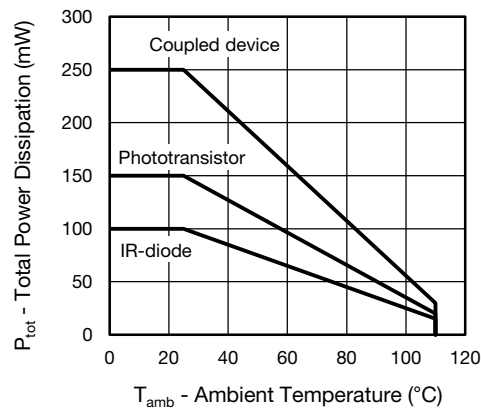


Fig. 1 - Total Power Dissipation vs. Ambient Temperature

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	$I_F = 5\text{ mA}$		V_F	-	1.16	1.5	V
Capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$		C_O	-	45	-	pF
Reverse current	$V_R = 6\text{ V}$		I_R	-	-	100	μA
OUTPUT							
Collector emitter leakage current	$V_{CE} = 10\text{ V}$, $I_F = 0\text{ A}$		I_{CEO}	-	10	200	nA
Collector emitter capacitance	$V_{CE} = 5\text{ V}$, $f = 1\text{ MHz}$		C_{CE}	-	7	-	pF
COUPLER							
Collector emitter saturation voltage	$I_C = 0.32\text{ mA}$, $I_F = 1\text{ mA}$	VOL618A-2	V_{CEsat}	-	0.25	0.4	V
	$I_C = 0.5\text{ mA}$, $I_F = 1\text{ mA}$	VOL618A-3	V_{CEsat}	-	0.25	0.4	V
Coupling capacitance	$f = 1\text{ MHz}$		C_C	-	0.25	-	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	$I_F = 1\text{ mA}$, $V_{CE} = 5\text{ V}$	VOL618A	CTR	50	-	600	%
		VOL618A-2	CTR	63	-	125	%
		VOL618A-3	CTR	100	-	200	%

SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Turn on time	$V_{CC} = 5\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\text{ }\Omega$	t_{on}	-	6	-	μs	
Rise time	$V_{CC} = 5\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\text{ }\Omega$	t_r	-	3.5	-	μs	
Turn off time	$V_{CC} = 5\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\text{ }\Omega$	t_{off}	-	5.5	-	μs	
Fall time	$V_{CC} = 5\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\text{ }\Omega$	t_f	-	5	-	μs	

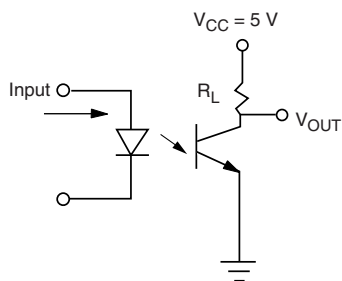


Fig. 2 - Test Circuit

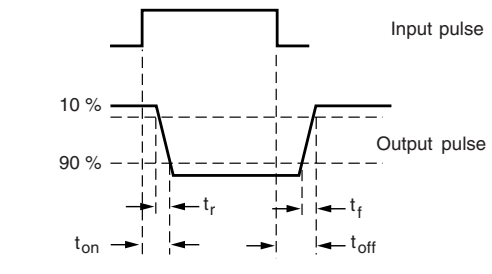


Fig. 3 - Test Circuit and Waveforms

SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 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}	5000	V_{RMS}
Maximum transient isolation voltage	According to DIN EN 60747-5-5	V_{IOTM}	8000	V_{peak}
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	V_{IORM}	1050	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
	$T_{amb} = TS$, $V_{IO} = 500\text{ V}$	R_{IO}	$\geq 10^9$	Ω
Output safety power		P_{SO}	265	mW
Input safety current		I_{SI}	130	mA
Input safety temperature		T_S	150	$^{\circ}\text{C}$
Creepage distance			≥ 8	mm
Clearance distance			≥ 8	mm
Insulation thickness		DTI	≥ 0.4	mm
Input to output test voltage, method B	$V_{IORM} \times 1.875 = V_{PR}$, 100 % production test with $t_M = 1\text{ s}$, partial discharge $< 5\text{ pC}$	V_{PR}	2000	V_{peak}
Input to output test voltage, method A	$V_{IORM} \times 1.6 = V_{PR}$, 100 % sample test with $t_M = 10\text{ s}$, partial discharge $< 5\text{ pC}$	V_{PR}	1680	V_{peak}

Note

- According to DIN EN 60747-5-5 (VDE 0884), § 7.4.3.8.2, (see Fig. 4). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

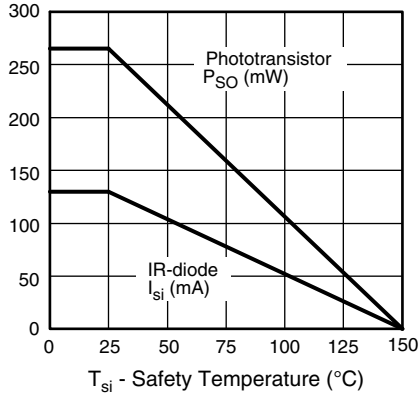


Fig. 4 - Derating Diagram

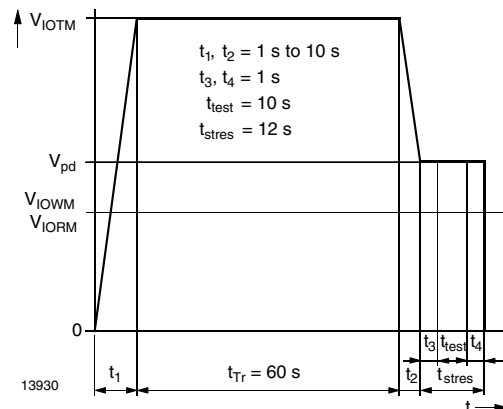


Fig. 5 - Test Pulse Diagram for Sample Test according to DIN EN 60747-5-5

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

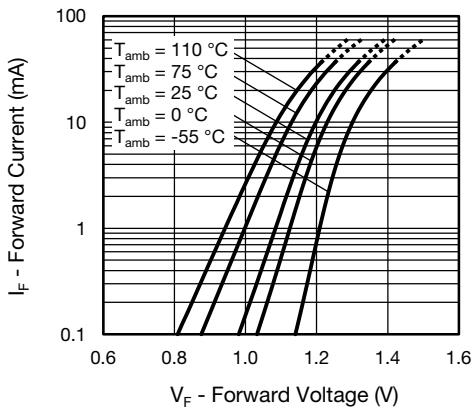


Fig. 6 - Forward Current vs. Forward Voltage

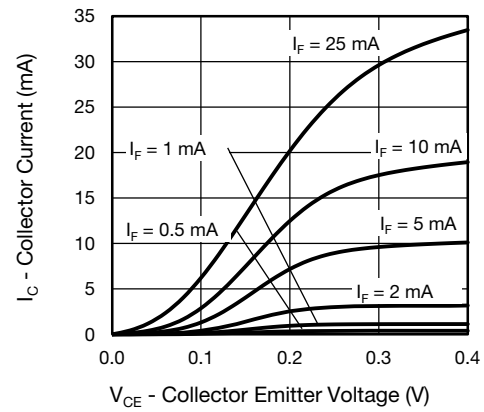


Fig. 9 - Collector Current vs. Collector Emitter Voltage (saturated)

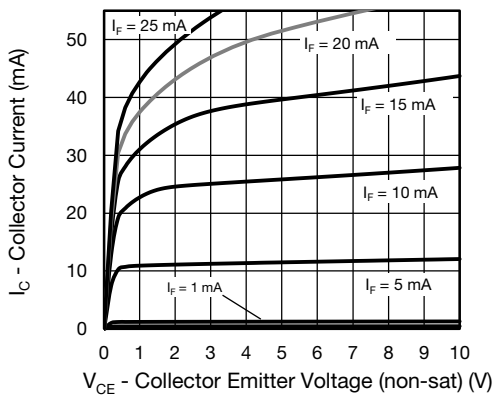


Fig. 7 - Collector Current vs. Collector Emitter Voltage (non-saturated)

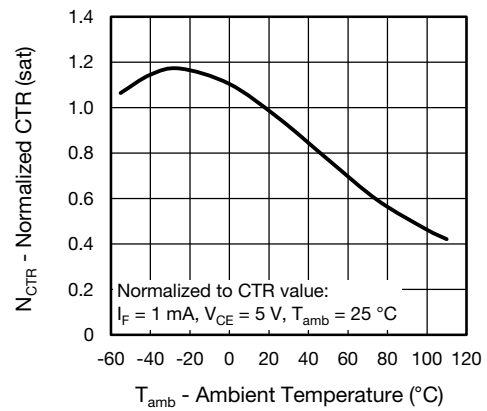


Fig. 10 - Normalized Current Transfer Ratio vs. Ambient Temperature (saturated)

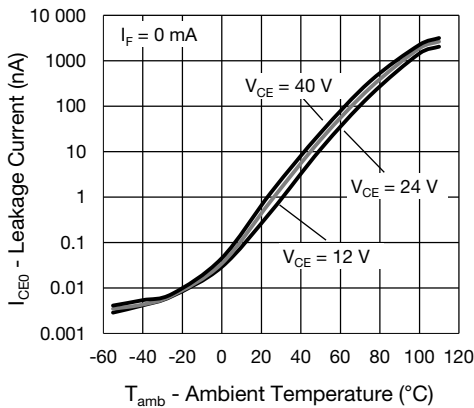


Fig. 8 - Collector Emitter Current vs. Ambient Temperature

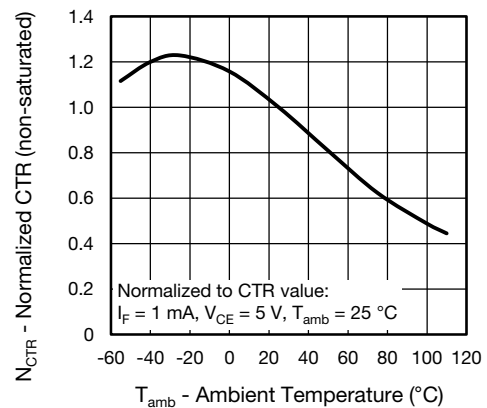


Fig. 11 - Normalized Current Transfer Ratio vs. Ambient Temperature (non-saturated)

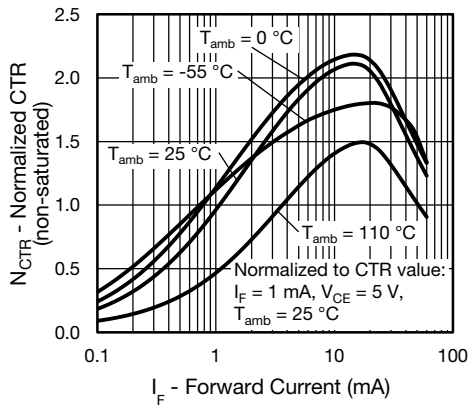


Fig. 12 - Normalized Current Transfer Ratio (non-saturated) vs. Forward Current

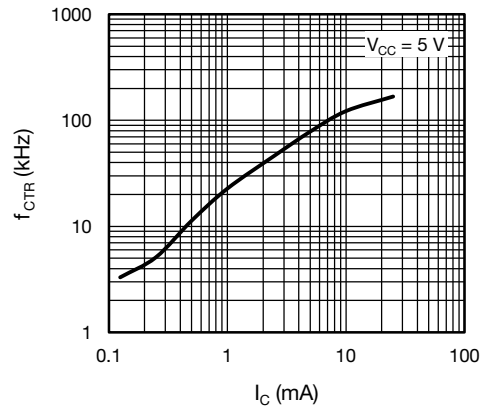


Fig. 15 - f_{CTR} vs. Collector Current

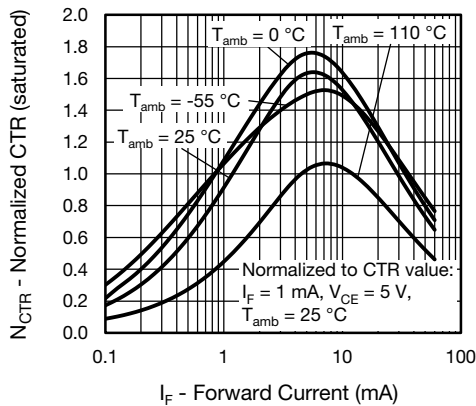


Fig. 13 - Normalized Current Transfer Ratio (saturated) vs. Forward Current

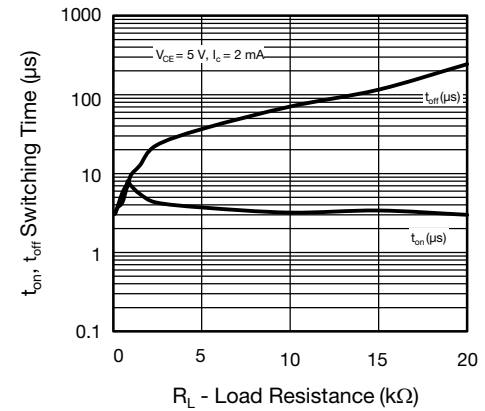


Fig. 16 - Switching Time vs. Load Resistance

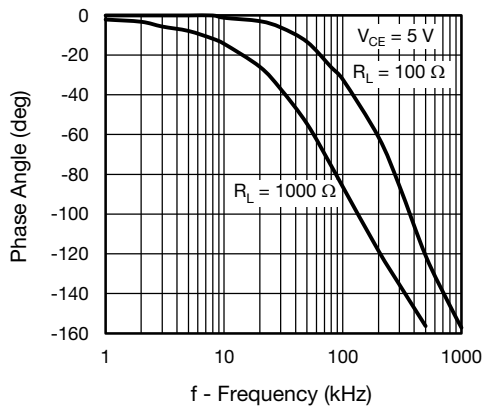


Fig. 14 - Phase Angle vs. Frequency

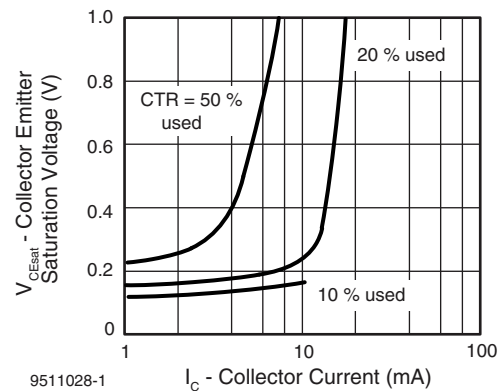


Fig. 17 - Collector Emitter Saturation Voltage vs. Collector Current

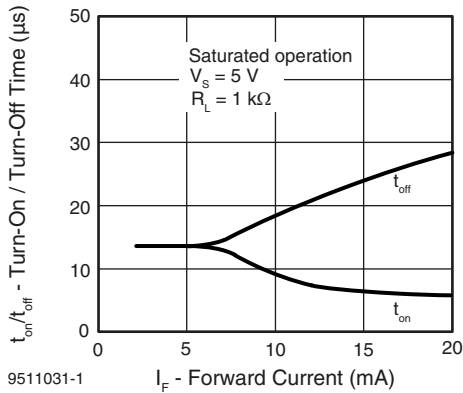


Fig. 18 - Turn-On/Turn-Off Time vs. Forward Current

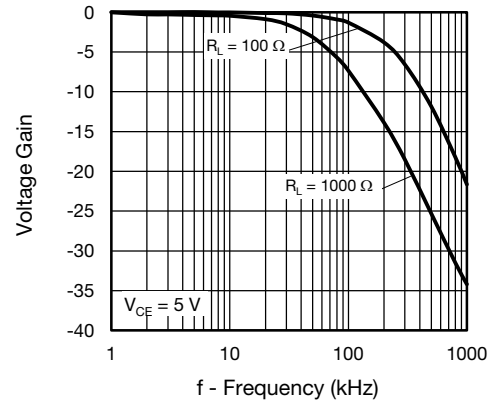
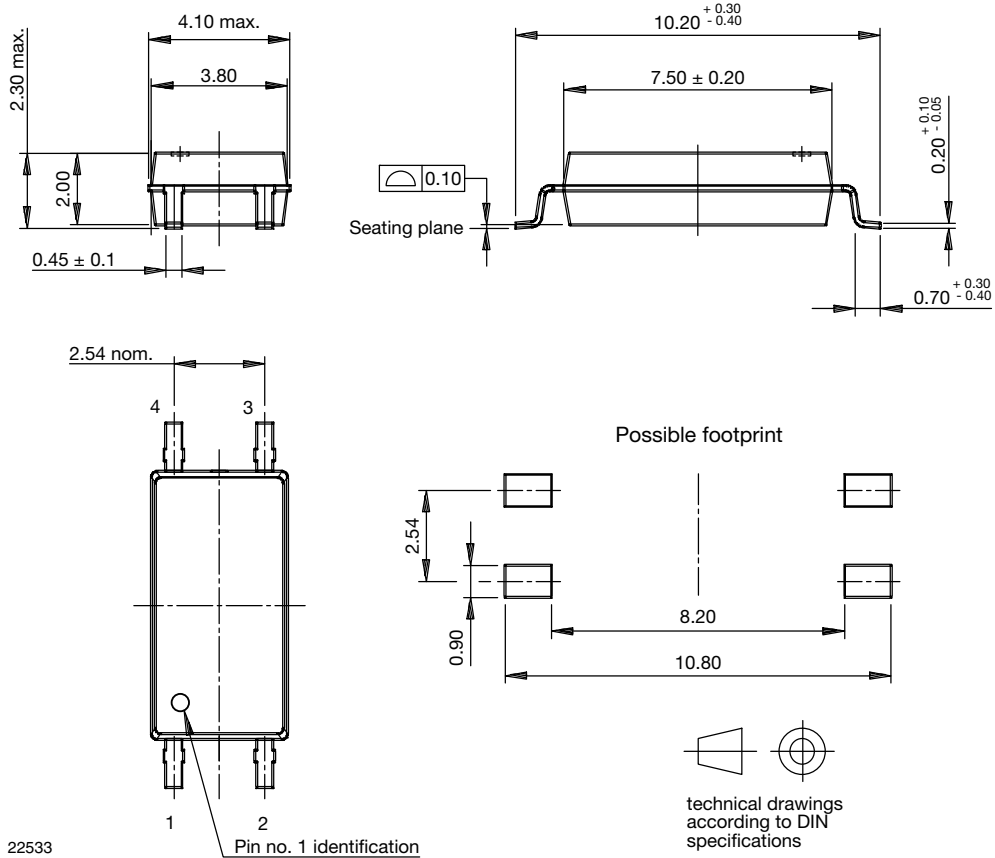
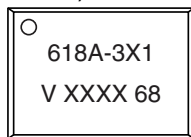


Fig. 19 - Voltage Gain vs. Cut-off Frequency

PACKAGE DIMENSIONS (in millimeters)



PACKAGE MARKING (example of VOL618A-3X001T)



Notes

- Only option 1 is reflected in the package marking with the characters “X1”
- Tape and reel suffix (T) is not part of the package marking
- XXXX = LMC (lot marking code)

TAPE AND REEL DIMENSIONS (in millimeters)

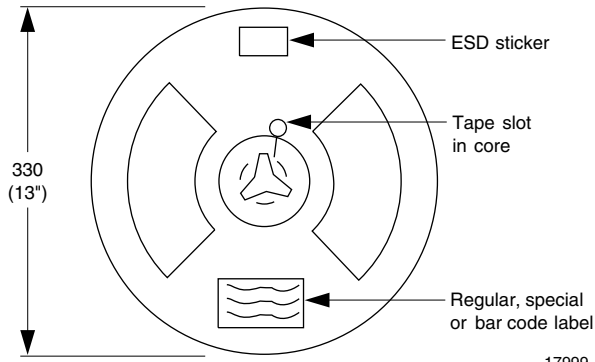


Fig. 20 - Reel Dimensions (3000 units per reel)

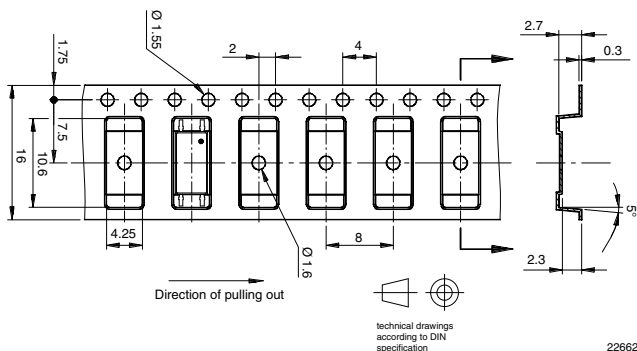


Fig. 21 - Tape Dimensions

SOLDER PROFILE

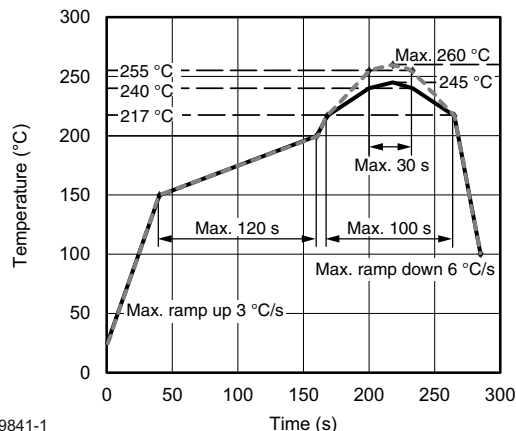


Fig. 22 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

HANDLING AND STORAGE CONDITIONS

- ESD level: HBM class 2
- Floor life: unlimited
- Conditions: $T_{amb} < 30\text{ }^{\circ}\text{C}$, $RH < 85\%$
- Moisture sensitivity level 1, according to J-STD-020



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