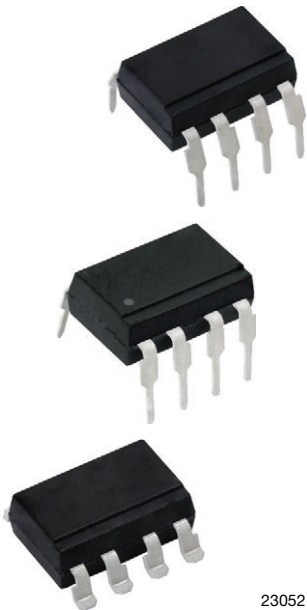
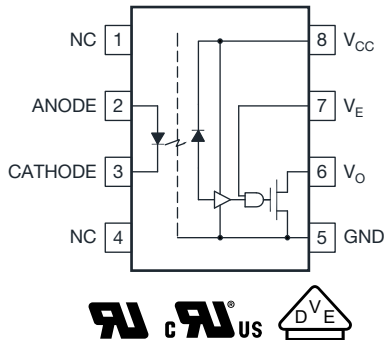


## High Speed Optocoupler, 10 MBd



23052



### DESCRIPTION

The VOH260A is a single channel 10 MBd optocoupler utilizing a high efficient input LED coupled to a high speed integrated photo-detector logic gate with a strobable output. This detector features an open drain output. The internal shield provides a guaranteed common mode transient immunity of 15 kV/μs.

### FEATURES

- Common mode rejection (CMR) of min. 15 kV/μs
- 3.3 V / 5 V dual supply voltage
- LVTTTL/LVCMOS compatibility
- Low power consumption
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### APPLICATIONS

- Microprocessor system interface
- Ground loop elimination
- Digital bus systems isolation
- High speed A/D and D/A conversion
- Digital control power supply
- Level shifting

### AGENCY APPROVALS

- UL1577 (pending)
- cUL (pending)
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1 (pending)



ORDERING INFORMATION	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px;">V</div> <div style="border: 1px solid black; padding: 2px 5px;">O</div> <div style="border: 1px solid black; padding: 2px 5px;">H</div> <div style="border: 1px solid black; padding: 2px 5px;">2</div> <div style="border: 1px solid black; padding: 2px 5px;">6</div> <div style="border: 1px solid black; padding: 2px 5px;">0</div> <div style="border: 1px solid black; padding: 2px 5px;">A</div> <div style="border: 1px solid black; padding: 2px 5px;">-</div> <div style="border: 1px solid black; padding: 2px 5px;">X</div> <div style="border: 1px solid black; padding: 2px 5px;">0</div> <div style="border: 1px solid black; padding: 2px 5px;">#</div> <div style="border: 1px solid black; padding: 2px 5px;">#</div> <div style="border: 1px solid black; padding: 2px 5px;">T</div> </div>	
PART NUMBER	PACKAGE OPTION
	T T A P E A N D R E E L
AGENCY CERTIFIED / PACKAGE	
UL, cUL, DEMKO	
DIP-8	VOH260A
DIP-8, 400 mil (option 6)	VOH260A-X006
SMD-8 (option 7)	VOH260A-X007T
UL, cUL, DEMKO, VDE (option 1)	
DIP-8	VOH260A-X001
DIP-8, 400 mil (option 6)	VOH260A-X016
SMD-8 (option 7)	VOH260A-X017T

**Note**

- Additional options may be possible, please contact sales office

ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Input forward current		I <sub>F</sub>	20	mA
Reverse input voltage		V <sub>R</sub>	5	V
Enable input voltage		V <sub>E</sub>	V <sub>CC</sub> + 0.5 V	V
Enable input current		I <sub>E</sub>	5	mA
Input power dissipation		P <sub>diss</sub>	40	mW
<b>OUTPUT</b>				
Supply voltage		V <sub>CC</sub>	7	V
Output current		I <sub>O</sub>	50	mA
Output voltage		V <sub>O</sub>	7	V
Output power dissipation		P <sub>diss</sub>	85	mW
<b>COUPLER</b>				
Storage temperature		T <sub>stg</sub>	-55 to +125	°C
Operating temperature		T <sub>amb</sub>	-40 to +110	°C
Solder reflow temperature <sup>(1)</sup>	5 s		260	°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
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP)



<b>RECOMMENDED OPERATING CONDITIONS</b>				
<b>PARAMETER</b>	<b>SYMBOL</b>	<b>MIN.</b>	<b>MAX.</b>	<b>UNIT</b>
Operating temperature	T <sub>amb</sub>	-40	+110	°C
Supply voltage	V <sub>CC</sub>	2.7	3.6	V
	V <sub>CC</sub>	4.5	5.5	V
Input current low level	I <sub>FL</sub>	0	250	μA
Input current high level	I <sub>FH</sub>	5	15	mA
Logic low enable voltage	V <sub>EL</sub>	0	0.8	V
Logic high enable voltage	V <sub>EH</sub>	2	V <sub>CC</sub>	V
Output pull up resistor	R <sub>L</sub>	330	4000	Ω
Fanout (R <sub>L</sub> = 1 kΩ)	N	-	5	TTL loads

<b>TRUTH TABLE (positive logic)</b>		
<b>LED</b>	<b>ENABLE</b>	<b>OUTPUT</b>
On	H	L
Off	H	H
On	L	H
Off	L	H
On	Not connected / open	L
Off	Not connected / open	H



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+110\text{ }^{\circ}\text{C}$ , $2.7\text{ V} \leq V_{CC} \leq 3.6\text{ V}$ , $I_F = 7.5\text{ mA}$ , unless otherwise specified; typical values are at $V_{CC} = 3.3\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$ )						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Input forward voltage	$I_F = 10\text{ mA}$	$V_F$	-	1.38	1.70	V
Input forward voltage temperature coefficient	$I_F = 10\text{ mA}$	$\Delta V_F/\Delta T$	-	-1.5	-	mV/K
Input reverse voltage	$I_R = 10\text{ }\mu\text{A}$	$BV_R$	5	-	-	V
Input threshold current	$V_E = 2\text{ V}$ , $V_O = 0.6\text{ V}$ , $V_{CC} = 3.3\text{ V}$ , $I_{OL}(\text{sinking}) = 13\text{ mA}$	$I_{TH}$	-	2	5	mA
Input capacitance	$f = 1\text{ MHz}$ , $V_F = 0\text{ V}$	$C_I$	-	34	-	pF
<b>OUTPUT</b>						
Low level supply current	$I_F = 10\text{ mA}$ , $V_{CC} = 3.3\text{ V}$ , $V_E = 0.5\text{ V}$	$I_{CCL}$	-	3.1	5	mA
High level supply current	$I_F = 0\text{ mA}$ , $V_{CC} = 3.3\text{ V}$ , $V_E = 0.5\text{ V}$	$I_{CCH}$	-	3.3	5	mA
Low level enable current	$V_{CC} = 3.3\text{ V}$ , $V_E = 0.5\text{ V}$	$I_{EL}$	-	-0.41	-1.6	mA
High level enable current	$V_{CC} = 3.3\text{ V}$ , $V_E = 2\text{ V}$	$I_{EH}$	-	-0.19	-1.6	mA
Low level enable voltage		$V_{EL}$	-	-	0.8	V
High level enable voltage		$V_{EH}$	2	-	-	V
Low level output voltage	$V_{CC} = 3.3\text{ V}$ , $V_E = 2\text{ V}$ , $I_F = 5\text{ mA}$ , $I_{OL}(\text{sinking}) = 13\text{ mA}$	$V_{OL}$	-	0.2	0.6	V
High level output current	$V_{CC} = 3.3\text{ V}$ , $V_E = 2\text{ V}$ , $V_O = 3.3\text{ V}$ , $I_F = 250\text{ }\mu\text{A}$	$I_{OH}$	-	1	10	$\mu\text{A}$
<b>COUPLER</b>						
Input to output capacitance	$f = 1\text{ MHz}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$	$C_{IO}$	-	1	-	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.

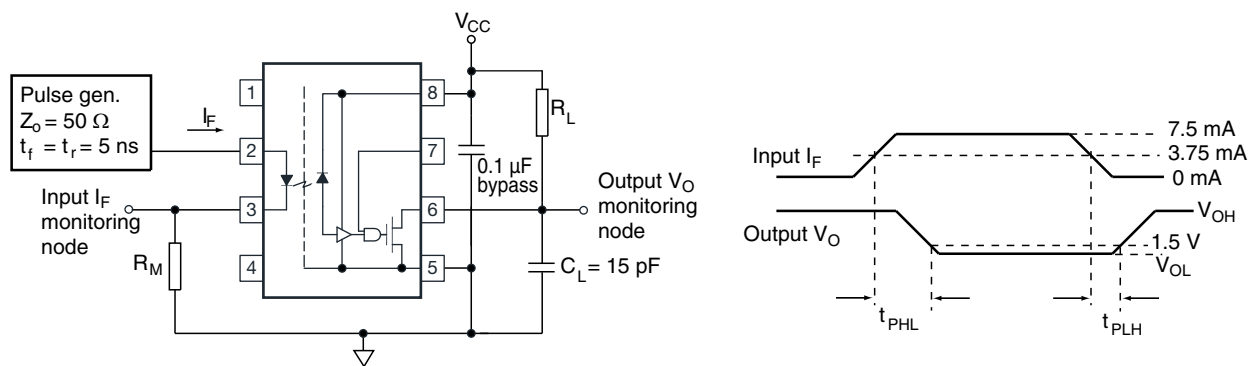
<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+110\text{ }^{\circ}\text{C}$ , $4.5\text{ V} \leq V_{CC} \leq 5.5\text{ V}$ , $I_F = 7.5\text{ mA}$ , unless otherwise specified; typical values are at $V_{CC} = 5.0\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$ )						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Input forward voltage	$I_F = 10\text{ mA}$	$V_F$	-	1.38	1.70	V
Input forward voltage temperature coefficient	$I_F = 10\text{ mA}$	$\Delta V_F/\Delta T$	-	-1.5	-	mV/K
Input reverse voltage	$I_R = 10\text{ }\mu\text{A}$	$BV_R$	5	-	-	V
Input threshold current	$V_E = 2\text{ V}$ , $V_O = 0.6\text{ V}$ , $V_{CC} = 5.5\text{ V}$ , $I_{OL}(\text{sinking}) = 13\text{ mA}$	$I_{TH}$	-	2	5	mA
Input capacitance	$f = 1\text{ MHz}$ , $V_F = 0\text{ V}$	$C_I$	-	34	-	pF
<b>OUTPUT</b>						
Low level supply current	$I_F = 10\text{ mA}$ , $V_{CC} = 5.5\text{ V}$ , $V_E = 0.5\text{ V}$	$I_{CCL}$	-	3.5	5	mA
High level supply current	$I_F = 0\text{ mA}$ , $V_{CC} = 5.5\text{ V}$ , $V_E = 0.5\text{ V}$	$I_{CCH}$	-	3.7	5	mA
Low level enable current	$V_{CC} = 5.5\text{ V}$ , $V_E = 0.5\text{ V}$	$I_{EL}$	-	-0.9	-1.6	mA
High level enable current	$V_{CC} = 5.5\text{ V}$ , $V_E = 2\text{ V}$	$I_{EH}$	-	-0.19	-1.6	mA
Low level enable voltage		$V_{EL}$	-	-	0.8	V
High level enable voltage		$V_{EH}$	2	-	-	V
Low level output voltage	$V_{CC} = 5.5\text{ V}$ , $V_E = 2\text{ V}$ , $I_F = 5\text{ mA}$ , $I_{OL}(\text{sinking}) = 13\text{ mA}$	$V_{OL}$	-	0.20	0.60	V
High level output current	$V_{CC} = 5.5\text{ V}$ , $V_E = 2\text{ V}$ , $V_O = 5.5\text{ V}$ , $I_F = 250\text{ }\mu\text{A}$	$I_{OH}$	-	1	10	$\mu\text{A}$
<b>COUPLER</b>						
Collector emitter capacitance	$f = 1\text{ MHz}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$	$C_{IO}$	-	4	-	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>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+110\text{ }^{\circ}\text{C}$ , $2.7\text{ V} \leq V_{CC} \leq 3.6\text{ V}$ , $I_F = 7.5\text{ mA}$ , unless otherwise specified; typical values are at $V_{CC} = 3.3\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$ )						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Propagation delay time to high output level	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_{PLH}$	25	50	90	ns
Propagation delay time to low output level	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_{PHL}$	25	40	90	ns
Pulse width distortion	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$ t_{PLH} - t_{PHL} $	-	10	-	ns
Propagation delay skew	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_{PSK}$	-	-	40	ns
Output rise time (10 % to 90 %)	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_r$	-	23	-	ns
Output fall time (90 % to 10 %)	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_f$	-	10	-	ns
Propagation delay time of enable from $V_{EH}$ to $V_{EL}$	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$ , $V_{EL} = 0\text{ V}$ , $V_{EH} = 3\text{ V}$	$t_{ELH}$	-	15	-	ns
Propagation delay time of enable from $V_{EL}$ to $V_{EH}$	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$ , $V_{EL} = 0\text{ V}$ , $V_{EH} = 3\text{ V}$	$t_{EHL}$	-	15	-	ns

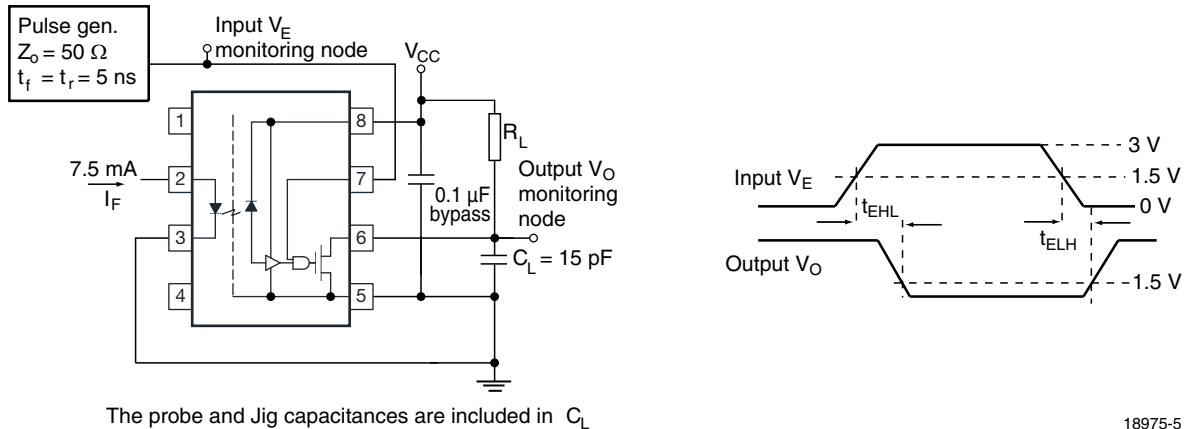
<b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+110\text{ }^{\circ}\text{C}$ , $4.5\text{ V} \leq V_{CC} \leq 5.5\text{ V}$ , $I_F = 7.5\text{ mA}$ , unless otherwise specified; typical values are at $V_{CC} = 5.0\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$ )						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Propagation delay time to high output level	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_{PLH}$	25	50	90	ns
	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$	$t_{PLH}$	-	-	100	ns
Propagation delay time to low output level	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_{PHL}$	25	40	90	ns
	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$	$t_{PHL}$	-	-	100	ns
Pulse width distortion	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$ t_{PLH} - t_{PHL} $	-	10	-	ns
Propagation delay skew	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_{PSK}$	-	-	40	ns
Output rise time (10 % to 90 %)	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_r$	-	23	-	ns
Output fall time (90 % to 10 %)	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$	$t_f$	-	10	-	ns
Propagation delay time of enable from $V_{EH}$ to $V_{EL}$	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$ , $V_{EL} = 0\text{ V}$ , $V_{EH} = 3\text{ V}$	$t_{ELH}$	-	15	-	ns
Propagation delay time of enable from $V_{EL}$ to $V_{EH}$	$R_L = 350\ \Omega$ , $C_L = 15\text{ pF}$ , $V_{EL} = 0\text{ V}$ , $V_{EH} = 3\text{ V}$	$t_{EHL}$	-	15	-	ns



The probe and jig capacitances are included in  $C_L$

Fig. 1 - Test Circuit for  $t_{PLH}$ ,  $t_{PHL}$ ,  $t_r$ , and  $t_f$

18964-7


 Fig. 2 - Test Circuit for  $t_{EHL}$  and  $t_{ELH}$ 

18975-5

COMMON MODE TRANSIENT IMMUNITY ( $T_{amb} = 25\text{ }^\circ\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Logic high common mode transient immunity	$V_{CC} = 3.3\text{ V}$ , $ V_{CM}  = 1000\text{ V}$ , $I_F = 0\text{ mA}$ , $V_O > 2.0\text{ V}$ , $R_L = 350\text{ }\Omega$	$ CM_H $	15 000	-	-	V/ $\mu\text{s}$
	$V_{CC} = 5\text{ V}$ , $ V_{CM}  = 1000\text{ V}$ , $I_F = 0\text{ mA}$ , $V_O > 2.0\text{ V}$ , $R_L = 350\text{ }\Omega$	$ CM_H $	15 000	-	-	V/ $\mu\text{s}$
Logic low common mode transient immunity	$V_{CC} = 5\text{ V}$ , $ V_{CM}  = 1000\text{ V}$ , $I_F = 10\text{ mA}$ , $V_O < 0.8\text{ V}$ , $R_L = 350\text{ }\Omega$	$ CM_L $	15 000	-	-	V/ $\mu\text{s}$
	$V_{CC} = 5\text{ V}$ , $ V_{CM}  = 1000\text{ V}$ , $I_F = 10\text{ mA}$ , $V_O < 0.8\text{ V}$ , $R_L = 350\text{ }\Omega$	$ CM_L $	15 000	-	-	V/ $\mu\text{s}$

**Notes**

- No external pull up is required for a high logic state on the enable input. If the enable pin is not used, connect it to  $V_{CC}$

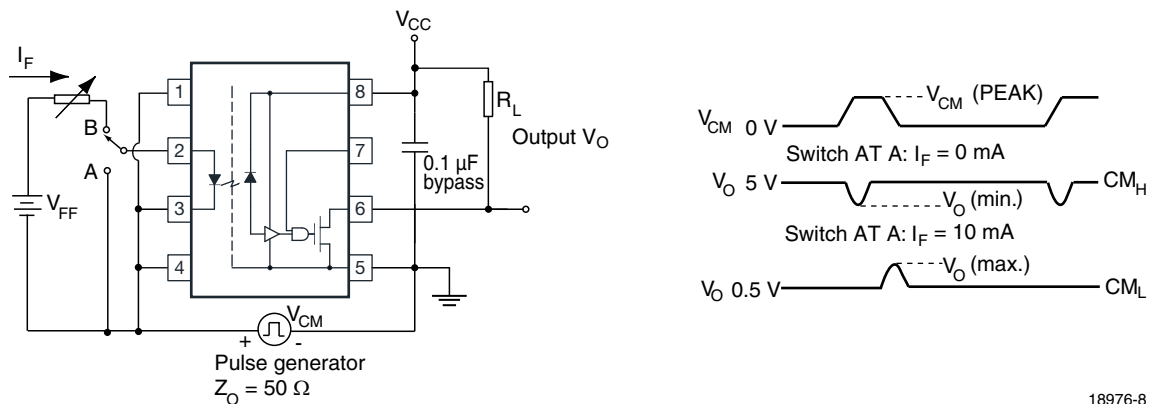


Fig. 3 - Test Circuit for Common Mode Transient Immunity

18976-8

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	$V_{IOTM}$	6000	$V_{peak}$
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	$V_{IORM}$	630	$V_{peak}$
Isolation resistance	$T_{amb} = 25\text{ }^{\circ}\text{C}$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
Maximum output power dissipation		$P_{SO}$	600	mW
Maximum input current		$I_{SI}$	230	mA
Maximum ambient temperature (derated)		$T_S$	175	$^{\circ}\text{C}$
Creepage distance	DIP-8, SMD-8		$\geq 7$	mm
	DIP-8, 400 mil		$\geq 8$	mm
Clearance distance	DIP-8, SMD-8		$\geq 7$	mm
	DIP-8, 400 mil		$\geq 8$	mm
Insulation thickness		DTI	$\geq 0.4$	mm

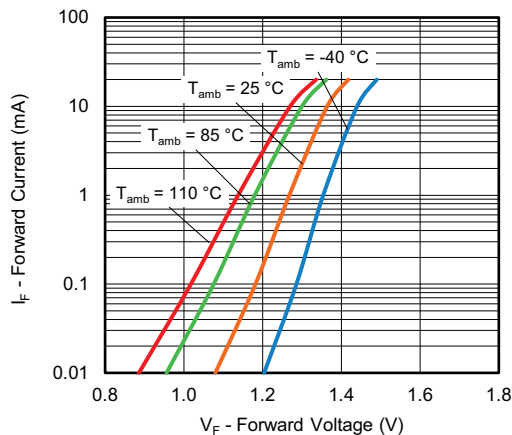
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 4 - Diode Forward Current vs. Forward Voltage

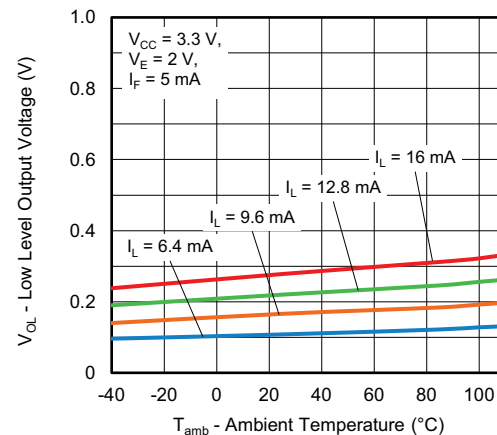


Fig. 6 - Low Level Output Voltage vs. Ambient Temperature

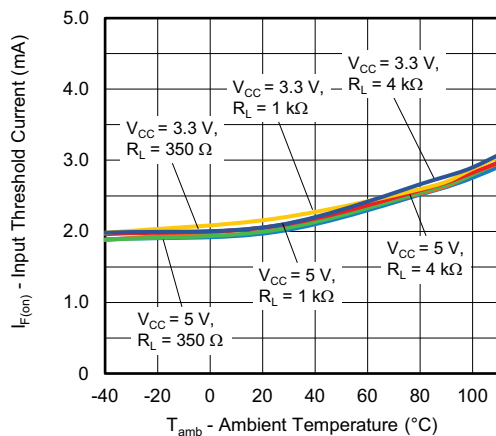


Fig. 5 - Input Threshold Current vs. Ambient Temperature

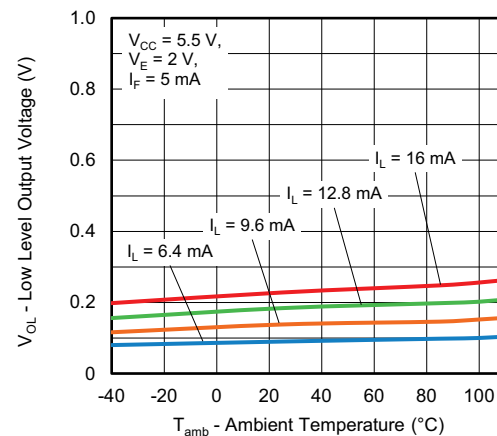


Fig. 7 - Low Level Output Voltage vs. Ambient Temperature

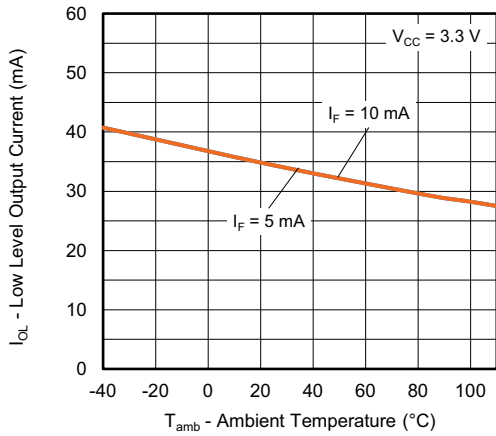


Fig. 8 - Low Level Output Current vs. Ambient Temperature

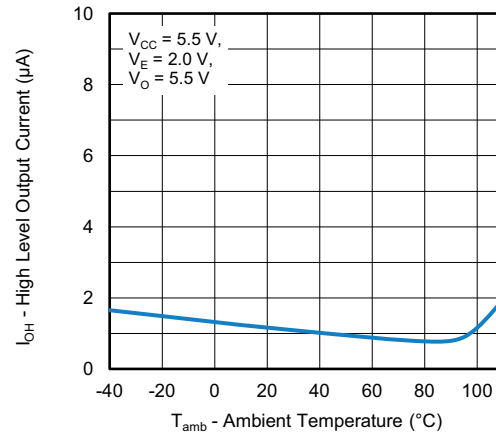


Fig. 11 - High Level Output Current vs. Ambient Temperature

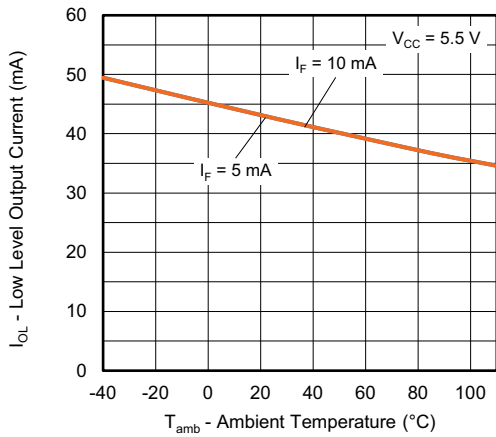


Fig. 9 - Low Level Output Current vs. Ambient Temperature

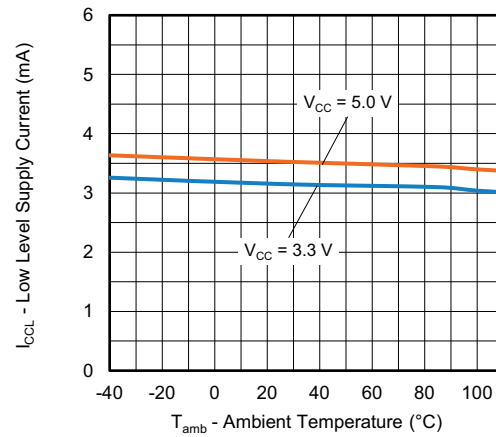


Fig. 12 - Low Level Supply Current vs. Ambient Temperature

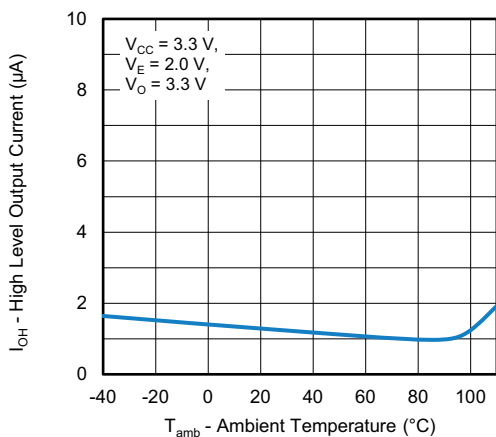


Fig. 10 - High Level Output Current vs. Ambient Temperature

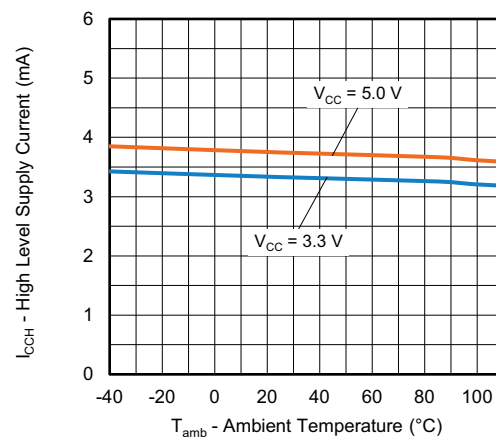


Fig. 13 - High Level Supply Current vs. Ambient Temperature



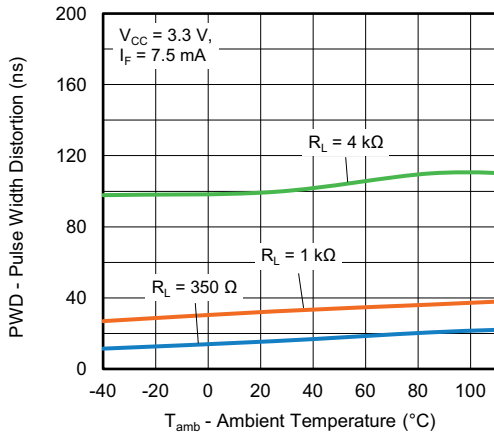


Fig. 14 - Pulse Width Distortion vs. Ambient Temperature

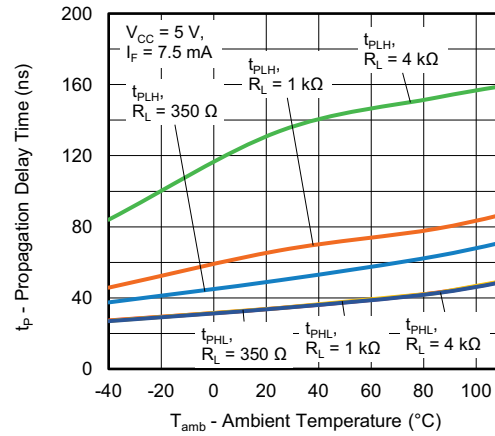


Fig. 17 - Propagation Delay Time vs. Ambient Temperature

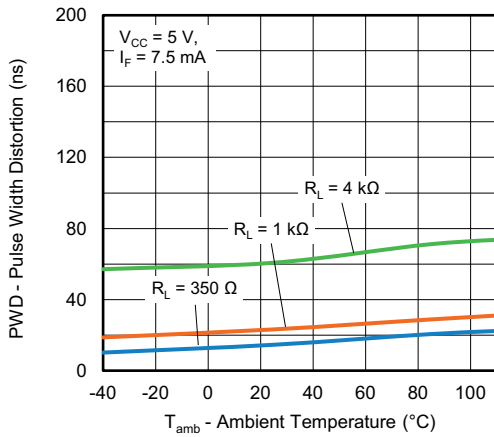


Fig. 15 - Pulse Width Distortion vs. Ambient Temperature

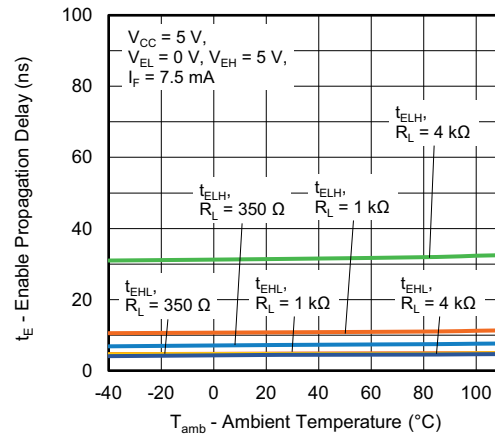


Fig. 18 - Enable Propagation Delay vs. Ambient Temperature

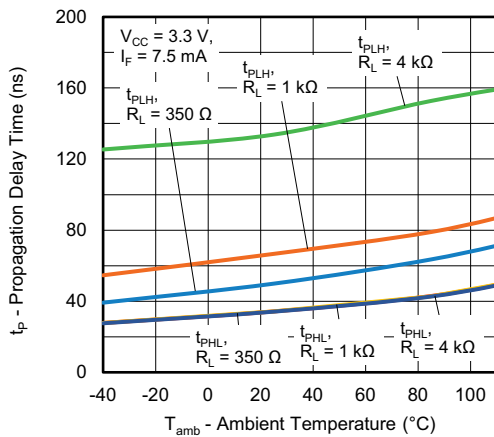


Fig. 16 - Propagation Delay Time vs. Ambient Temperature

**PACKAGE DIMENSIONS** (in millimeters)

**DIP-8**

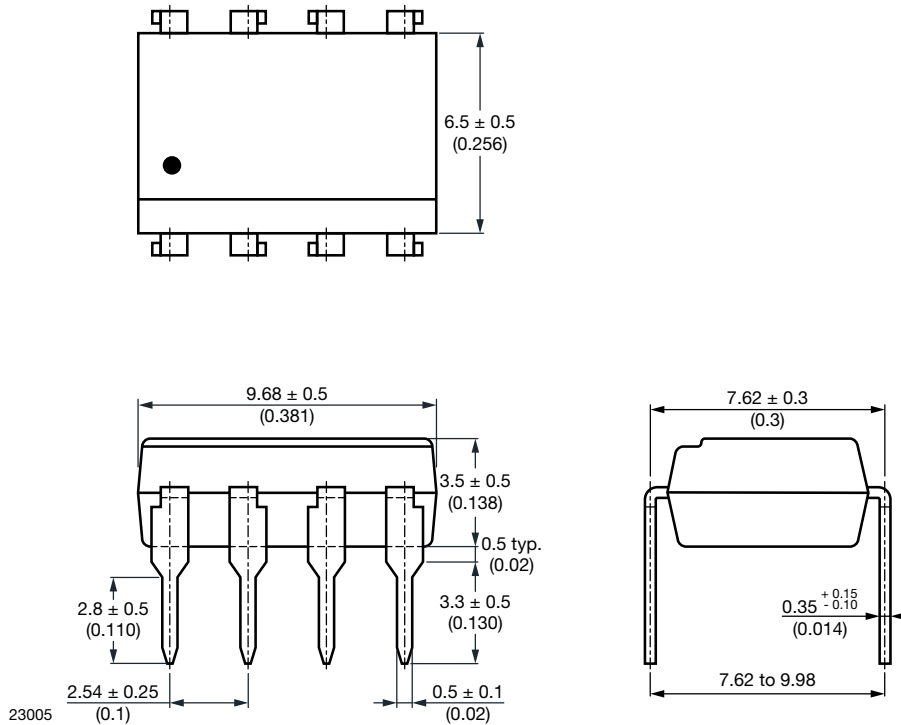


Fig. 19

**DIP-8, 400 mil**

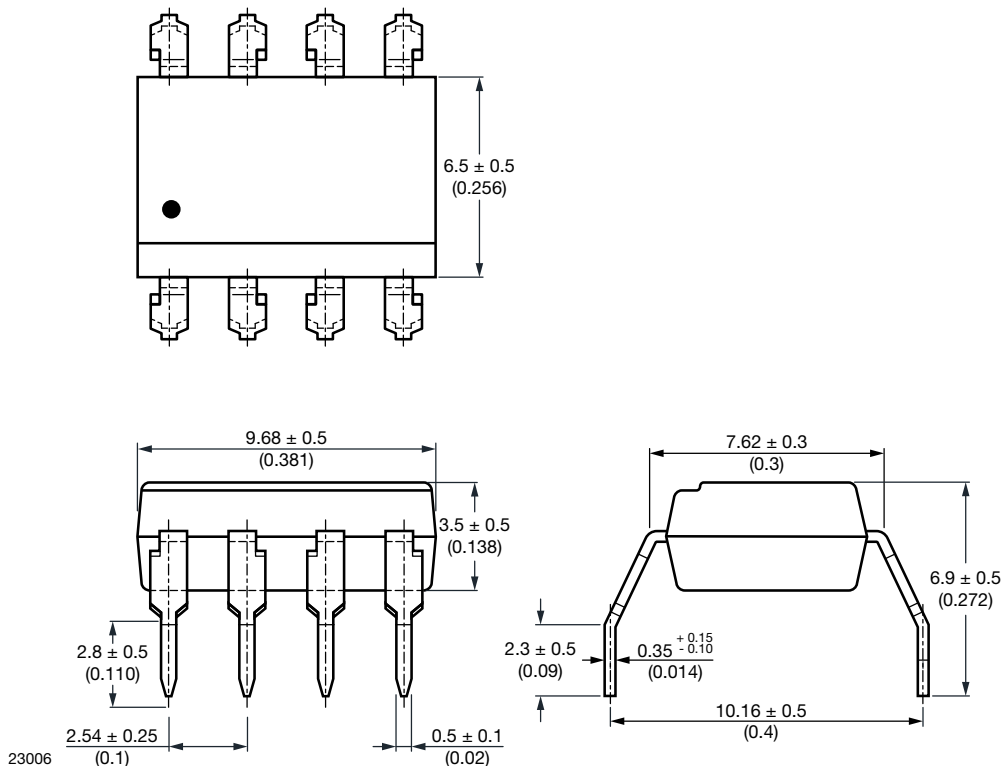


Fig. 20

SMD-8

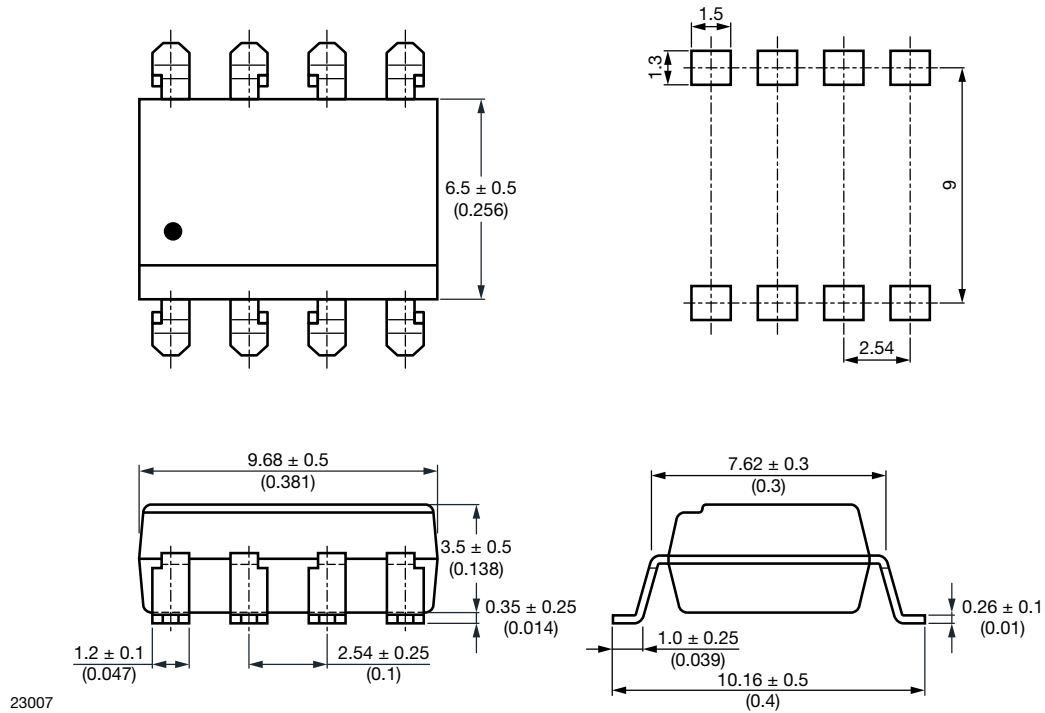


Fig. 21

PACKAGE MARKING

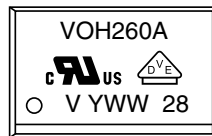


Fig. 22 - Example of VOH260A

Notes

- “YWW” is the date code marking (Y = year code, WW = week code)
- VDE logo is only marked on VDE option parts
- Tape and reel suffix (T) is not part of the package marking



PACKAGING INFORMATION (in millimeters)

DEVICES PER TUBES			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
DIP-8	50	40	2000
DIP-8, 400 mil	50	40	2000

SMD-8 Tape

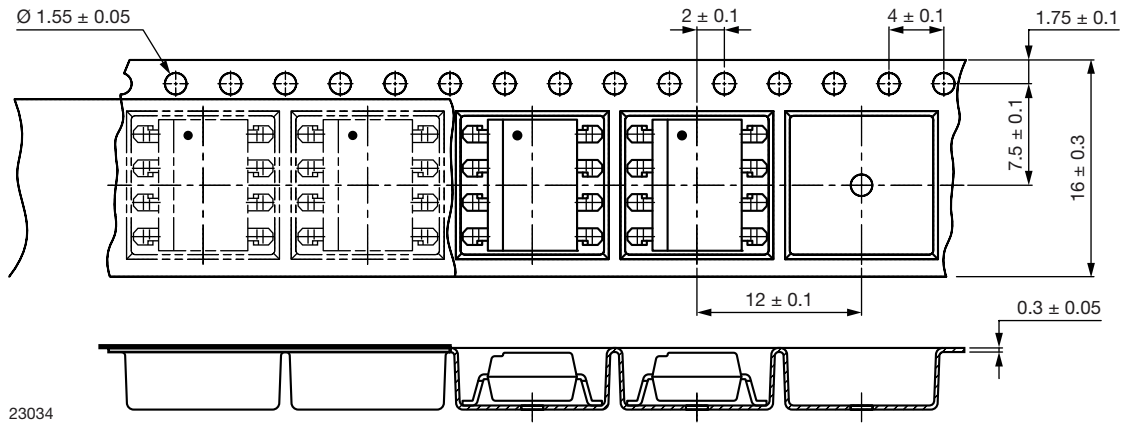


Fig. 23 - Tape and Reel Packaging (1000 pieces on reel)

Reel

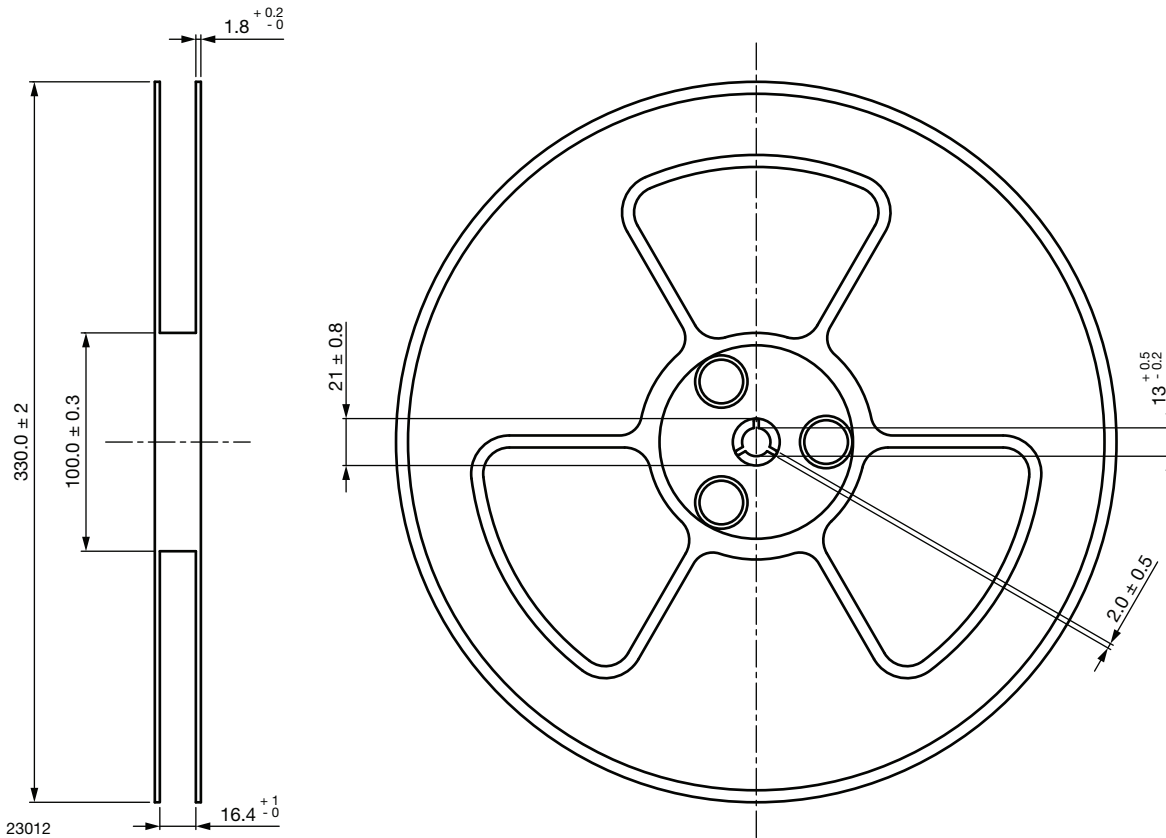


Fig. 24 - Tape and Reel Shipping Medium

**SOLDER PROFILES**

**IR Reflow Soldering (JEDEC® J-STD-020C compliant)**

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

PROFILE ITEM	CONDITIONS
Preheat	
- Temperature minimum ( $T_{S \text{ min.}}$ )	150 °C
- Temperature maximum ( $T_{S \text{ max.}}$ )	200 °C
- Time (min. to max.) ( $t_s$ )	90 s ± 30 s
Soldering zone	
- Temperature ( $T_L$ )	217 °C
- Time ( $t_L$ )	60 s
Peak temperature ( $T_p$ )	260 °C
Ramp-up rate	3 °C/s max.
Ramp-down rate	3 °C/s to 6 °C/s

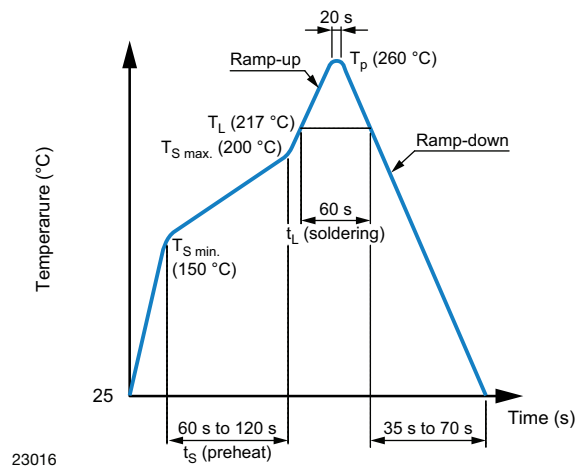


Fig. 1



**Wave Soldering (JEDEC JESD22-A111 compliant)**

One time soldering is recommended within the condition of temperature.

Temperature: 260 °C + 0 °C / - 5 °C

Time: 10 s

Preheat temperature: 25 °C to 140 °C

Preheat time: 30 s to 80 s

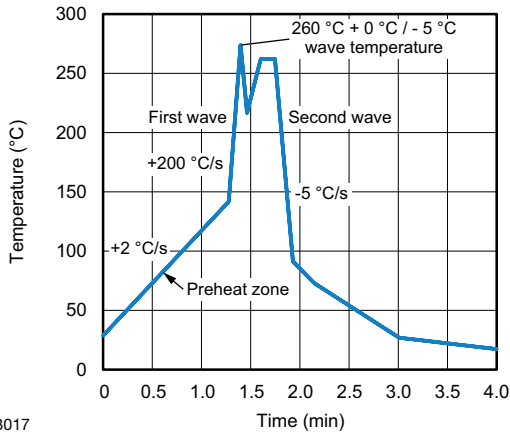
**HANDLING AND STORAGE CONDITIONS**

ESD level: HBM class 2

Floor life: unlimited

Conditions: T<sub>amb</sub> < 30 °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020



23017

Fig. 2

**Hand Soldering by Soldering Iron**

Allow single lead soldering in every single process. One time soldering is recommended.

Temperature: 380 °C + 0 °C / - 5 °C

Time: 3 s max.



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