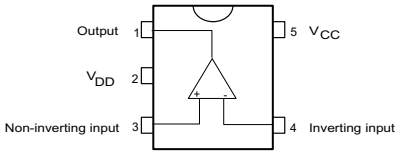
TS461, TS462, TS464

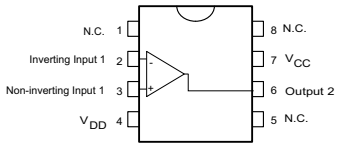
Output rail-to-rail operational amplifiers

Datasheet - production data

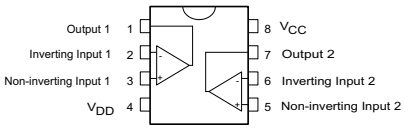
TS461CLT



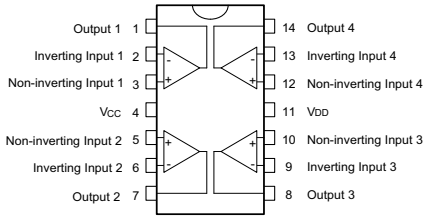
TS461CDT



TS462CDT-TS462CPT-TS462CST



TS464CDT-TS464CPT



Features

- High dynamic features
- Large output swing (±2.4 V at V_{CC} = ±2.5 V)
- Low noise level: 4 nV/√Hz
- Low distortion: 0.003 %
- Operating range: 2.7 V to 10 V
- Available in SOT23-5 micropackage

Applications

- Sound cards
- PDAs
- CD players
- Recording equipment
- Multimedia
- Microphone pre-amplifiers

Description

The TS461, TS462 and TS464 family of operational amplifiers can operate with voltages as low as ±1.35 V and reach a minimum of ±2 Vpp of output swing when supplied with ±2.5 V.

The devices are well-suited to all kinds of portable and battery-supplied equipment, where low noise and low distortion are key requirements.

The TS461, TS462 and TS464 offer excellent output rail-to-rail performances at an attractive cost.

Contents

1 Absolute maximum ratings and operating conditions

Table 1. Key parameters and their absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage (1)	12	V
V_{id}	Differential Input Voltage (2)	$\pm V_{CC}$	V
V_{in}	Input voltage range	V_{DD} -0.3 to V_{CC}+0.3	V
T_{oper}	Operating free air temperature range	-20 to +70	°C
T_{std}	Storage temperature range	-65 to +150	°C
T_j	Maximum junction temperature	150	°C
R_{thja}	Thermal resistance junction to case (3) SOT23-5 SO8 SO14 TSSOP8 TSSOP14	 250 125 103 120 100	°C/W
ESD	HBM: human body model (4)	2	kV
	MM: machine model (5)	200	V
	CDM: charged device model	1.5	kV
	Lead temperature (soldering, 10 sec)	250	°C

1. All voltages values, except differential voltage are with respect to network group terminal.
2. Differential voltages are non-inverting input terminal with respect to the inverting input terminal.
3. Short-circuits can cause excessive heating and destructive dissipation.
4. Human body model: 100 pF discharged through a 1.5 kΩ resistor into pin of device.
5. Machine model ESD: a 200 pF capacitor is charged to the specified voltage, then discharged directly into the IC with no external series resistor (internal resistor < 5 Ω), into pin-to-pin of device.

Table 2. Operating conditions

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	2.7 to 10	V
Vicm	Common mode input voltage range	V_{DD} +1.15 to V_{CC} - 1.15	V
T_{oper}	Operating free air temperature range	-20 to +70	°C

2 Electrical characteristics

Table 3. V_{CC} = 2.5 V, V_{DD} = -2.5 V, V_{icm} = V_{CC} / 2, R_L connected to V_{CC} / 2, T_{amb} = 25° C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage $T_{min.} \le T_{amb} \le T_{max.}$		1	5 7	mV
ΔV_{io}	Input offset voltage drift		5		µV/°C
I_{io}	Input offset current $T_{min.} \le T_{amb} \le T_{max.}$		10	150 200	nA
I_{ib}	Input bias current $T_{min.} \le T_{amb} \le T_{max.}$		200 200	750 1000	nA
CMR	Common mode rejection ratio V_{icm} = ±1.35 V	60	85		dB
SVR	Supply voltage rejection ratio V_{CC} = ±2 V to ±3 V	60	70		dB
A_{vd}	Large signal voltage gain R_L = 2 kΩ	70	80		dB
V_{OH}	High level output voltage R_L = 2 kΩ	2	2.4		V
V_{OL}	Low level output voltage R_L = 2 kΩ		-2.4	-2	V
I_{CC}	Supply current, per amplifier Unity gain - no load		2	2.8	mA
GBP	Gain bandwidth product f = 100 kHz, R_L = 2 kΩ, C_L = 100 pF	8.5	12		MHz
SR	Slew rate A_V = 1, V_{in} = ±1 V	2.8	4		V/µs
en	Equivalent input noise voltage f = 100 kHz		4		$\frac{nV}{\sqrt{Hz}}$
THD	Total harmonic distortion f = 1 kHz, A_V = -1, R_L = 10 kΩ		0.003		%

3 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK is an ST trademark.

3.1 SOT23-5 package information

Figure 1. SOT23-5 package mechanical drawing

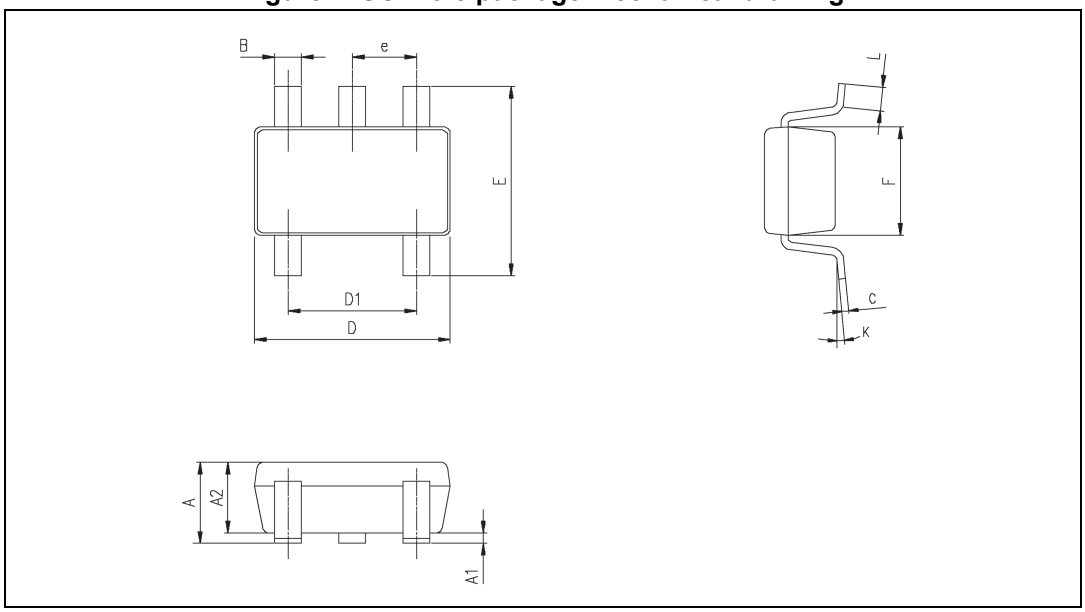


Table 4. SOT23-5 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90	1.20	1.45	0.035	0.047	0.057
A1			0.15			0.006
A2	0.90	1.05	1.30	0.035	0.041	0.051
B	0.35	0.40	0.50	0.013	0.015	0.019
C	0.09	0.15	0.20	0.003	0.006	0.008
D	2.80	2.90	3.00	0.110	0.114	0.118
D1		1.90			0.075	
e		0.95			0.037	
E	2.60	2.80	3.00	0.102	0.110	0.118
F	1.50	1.60	1.75	0.059	0.063	0.069
L	0.10	0.35	0.60	0.004	0.013	0.023
K	0 degrees		10 degrees			

3.2 SO-8 package information

Figure 2. SO-8 package mechanical drawing

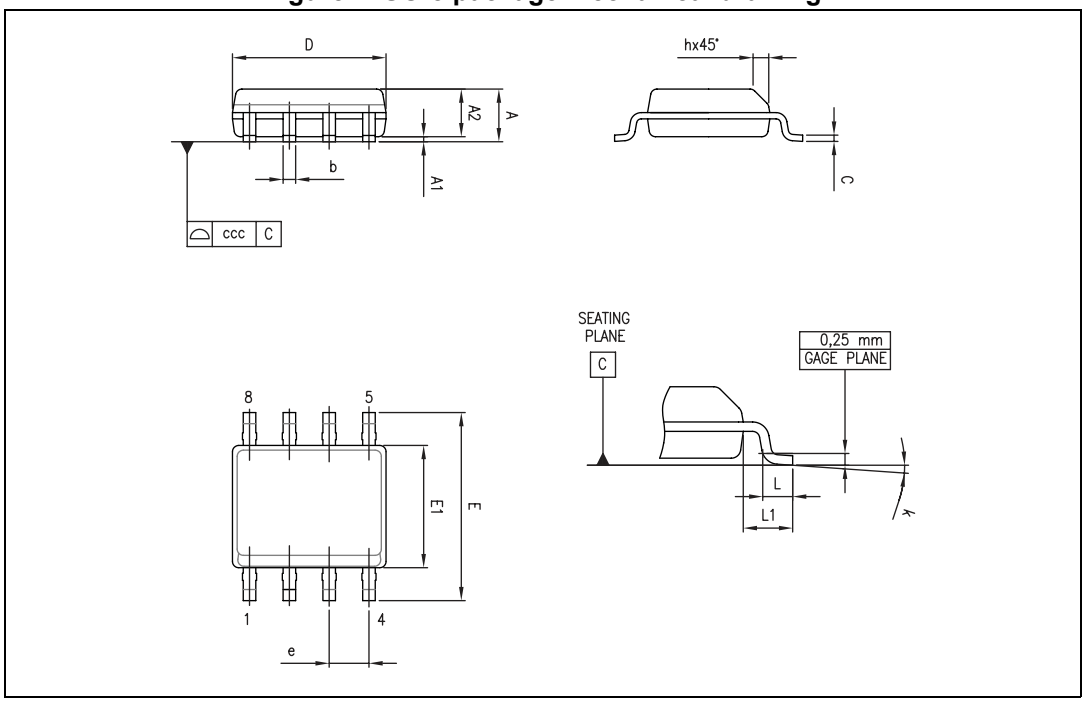


Table 5. SO-8 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
A1	0.10		0.25	0.004		0.010
A2	1.25			0.049		
b	0.28		0.48	0.011		0.019
c	0.17		0.23	0.007		0.010
D	4.80	4.90	5.00	0.189	0.193	0.197
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e		1.27			0.050	
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
L1		1.04			0.040	
k	1°		8°	1°		8°
ccc			0.10			0.004

3.3 MiniSO-8 package information

Figure 3. MiniSO-8 package mechanical drawing

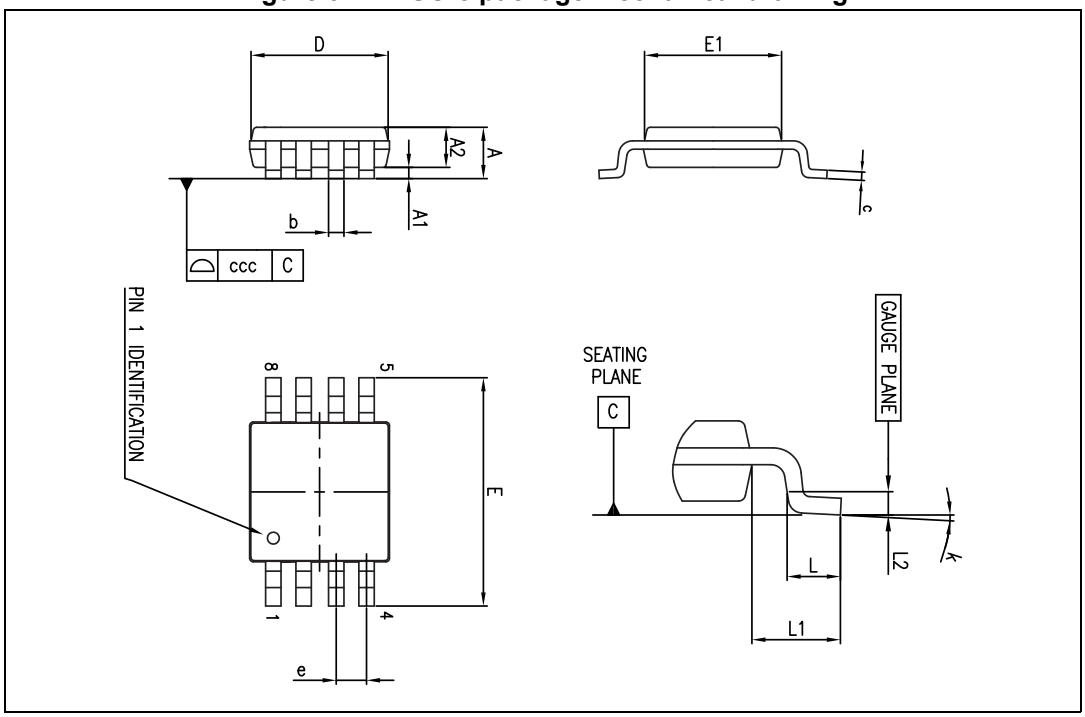


Table 6. MiniSO-8 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.1			0.043
A1	0		0.15	0		0.006
A2	0.75	0.85	0.95	0.030	0.033	0.037
b	0.22		0.40	0.009		0.016
c	0.08		0.23	0.003		0.009
D	2.80	3.00	3.20	0.11	0.118	0.126
E	4.65	4.90	5.15	0.183	0.193	0.203
E1	2.80	3.00	3.10	0.11	0.118	0.122
e		0.65			0.026	
L	0.40	0.60	0.80	0.016	0.024	0.031
L1		0.95			0.037	
L2		0.25			0.010	
k	0°		8°	0°		8°
ccc			0.10			0.004

3.4 TSSOP8 package information

Figure 4. TSSOP8 package mechanical drawing

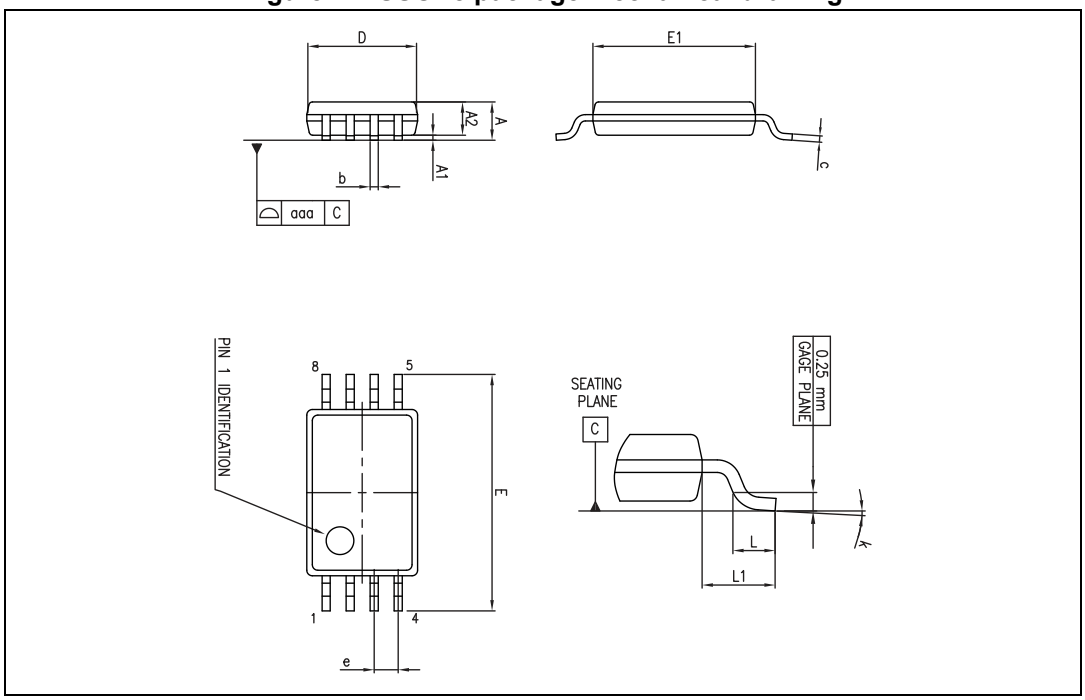


Table 7. TSSOP8 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.20			0.047
A1	0.05		0.15	0.002		0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.008
D	2.90	3.00	3.10	0.114	0.118	0.122
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.177
e		0.65			0.0256	
k	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030
L1		1			0.039	
aaa			0.10			0.004

3.5 TSSOP14 package information

Figure 5. TSSOP14 package mechanical drawing

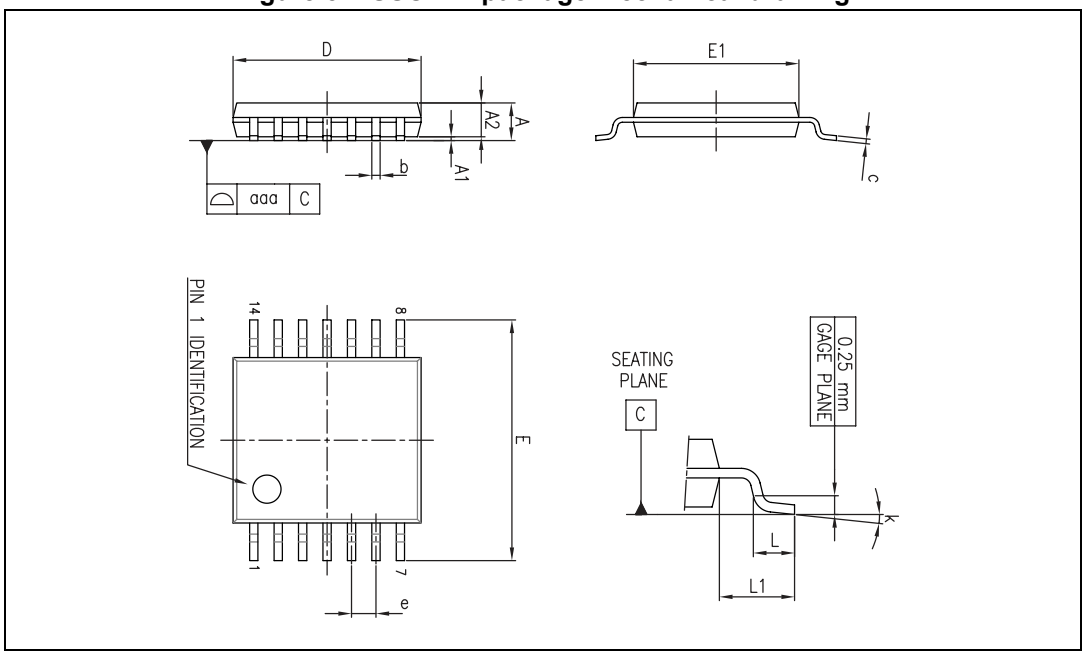


Table 8. TSSOP14 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.20			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0089
D	4.90	5.00	5.10	0.193	0.197	0.201
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.176
e		0.65			0.0256	
L	0.45	0.60	0.75	0.018	0.024	0.030
L1		1.00			0.039	
k	0°		8°	0°		8°
aaa			0.10			0.004

3.6 SO-14 package information

Figure 6. SO-14 package mechanical drawing

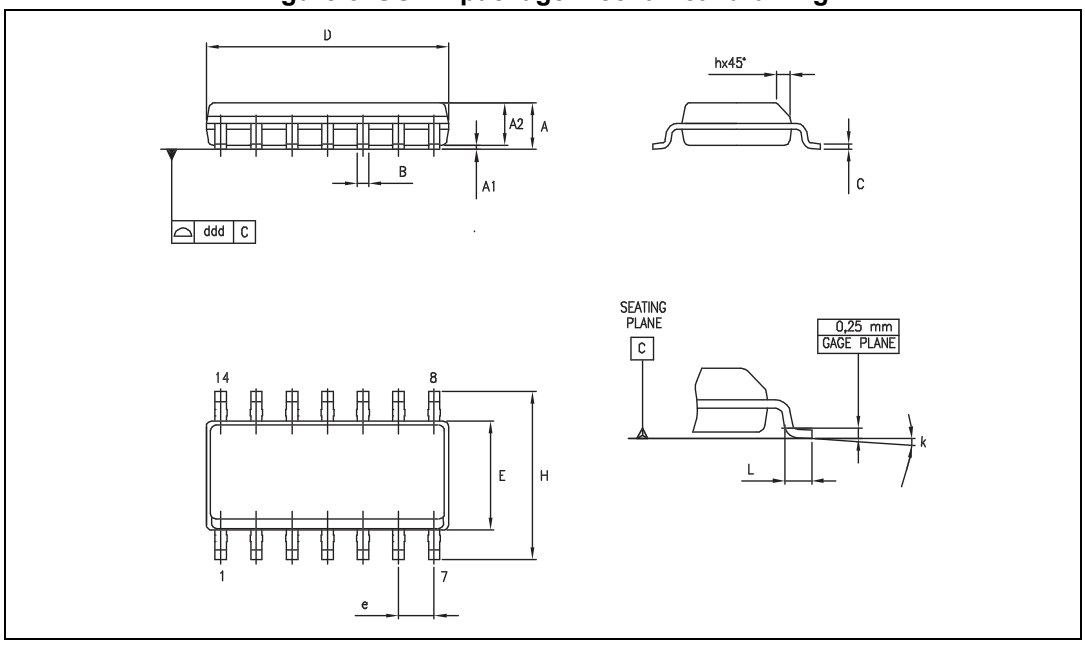


Table 9. SO-14 package mechanical data

Dimensions						
Ref.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.75	0.05		0.068
A1	0.10		0.25	0.004		0.009
A2	1.10		1.65	0.04		0.06
B	0.33		0.51	0.01		0.02
C	0.19		0.25	0.007		0.009
D	8.55		8.75	0.33		0.34
E	3.80		4.0	0.15		0.15
e		1.27			0.05	
H	5.80		6.20	0.22		0.24
h	0.25		0.50	0.009		0.02
L	0.40		1.27	0.015		0.05
k	8° (max.)					
ddd			0.10			0.004

4 Ordering information

Table 10. Order codes

Order code	Temperature range	Package	Packing	Marking
TS461CLT	-20° C, +70° C	SOT23-5L	Tape & reel	K105
TS461CDT		SO-8	Tape & reel	461C
TS462CST		Mini SO-8	Tape & reel	462C
TS462CPT		TSSOP-8	Tape & reel	462C
TS462CDT		SO-8	Tape & reel	462C
TS464CPT		TSSOP-14	Tape & reel	464C
TS464CDT		SO-14	Tape & reel	464C

5 Revision history

Table 11. Document revision history

Date	Revision	Changes
01-Jan-2002	1	Initial release.
01-Mar-2005	2	Modified Table 1: Key parameters and their absolute maximum ratings on page 2 (explanation of Vid and Vi limits).
02-Apr-2009	3	Document reformatted. Removed order codes in DIP package.
20-Apr-2026	4	Updated figure on the cover page and *Table 10: Order codes*.