Table 14: Application Example—Push-Button Control

Control Step	Function	Action
1	Select Record/Playback Mode	P/$\overline{R}$ = As desired
2A 2B	Begin playback Begin record	P/$\overline{R}$ = HIGH, $\overline{CE}$ = Pulsed LOW P/$\overline{R}$ = LOW, $\overline{CE}$ = Pulsed LOW
3	Pause record or playback	$\overline{CE}$ = Pulsed LOW
4A 4B	End playback End record	Automatic at $\overline{EOM}$ marker or PD = Pulsed HIGH PD = Pulsed HIGH

Table 15: Application Example—Passive Component Functions

Part	Function	Comments
R2	Release time constant	Sets release time for AGC
R4	Series limiting resistor	Reduces level to prevent distortion at higher supply voltages
R6, R7	Pull-up and pull-down resistors	Defines static state of inputs
C1, C4, C5	Power supply capacitors	Filters and bypass of power supply
C2	Attack/Release time constant	Sets attack/release time for AGC
C3	Low-frequency cutoff capacitor	Provides additional pole for low-frequency cutoff

Table 16: Push-Button Parameters

Symbol	Characteristic		Min	Typ (1)	Max	Units	Conditions
T_{CE}	$\overline{CE}$ Pulse Width [Start/Pause]			300		nsec	
T_{SET}	Control/Address Setup Time			300		nsec	
T_{PUD}	Power-Up Delay	ISD2532 ISD2540 ISD2548 ISD2564		25 31.25 37.25 50.0		msec msec msec msec	
T_{PD}	PD Pulse Width [Stop/Reset]			300		nsec	
T_{RUN}	$\overline{CE}$ to $\overline{EOM}$ HIGH		25		400	nsec	
T_{PAUSE}	$\overline{CE}$ to $\overline{EOM}$ LOW		50		400	nsec	
T_{DB}	$\overline{CE}$ HIGH Debounce	ISD2532 ISD2540 ISD2548 ISD2564	70 85 105 135		105 135 160 215	msec msec msec msec	

PUSH-BUTTON TIMING DIAGRAMS

Figure 7: Push-Button Mode Record

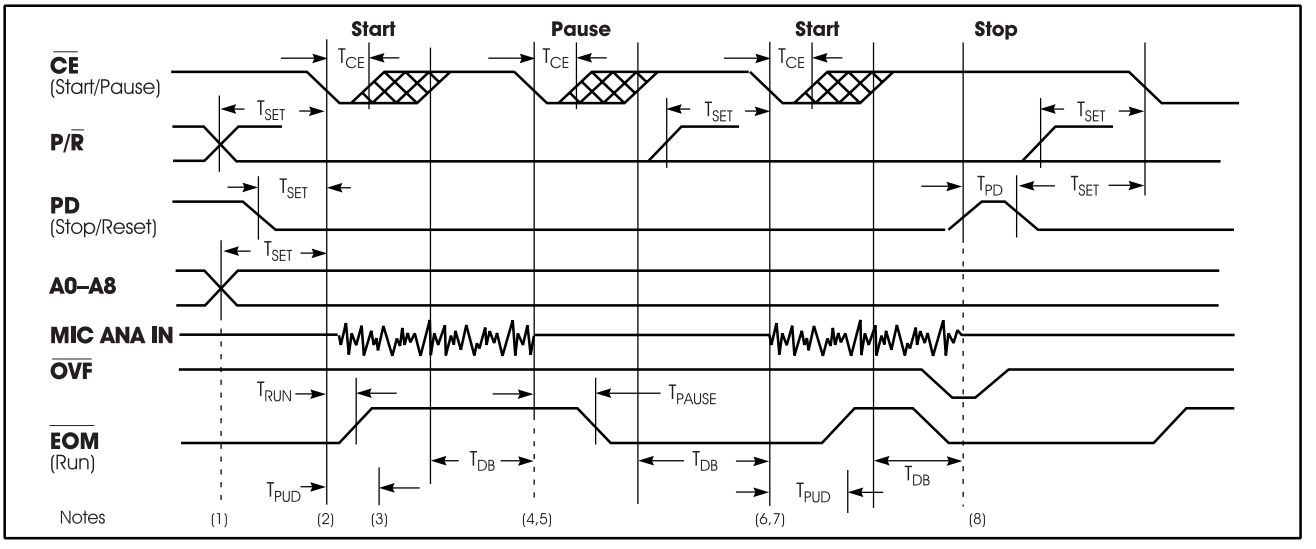
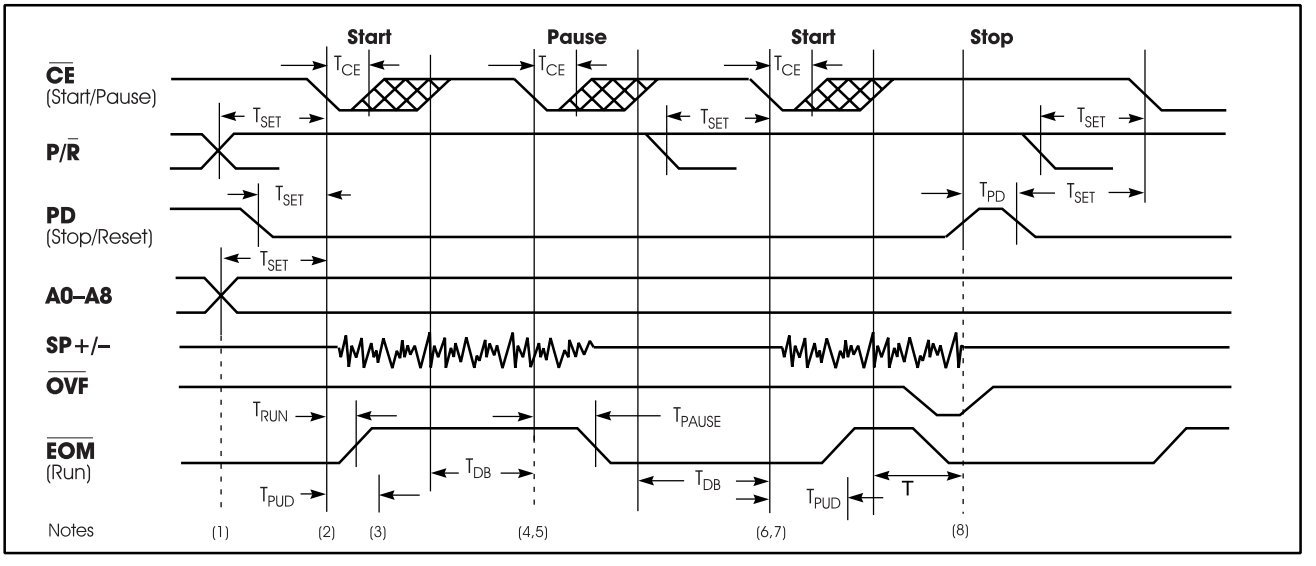


Figure 8: Push-Button Mode Playback



1. *A8, A7, and A6 = 1 for push-button operation.*
2. *The first $\overline{CE}$ LOW pulse performs a start function.*
3. *The part will begin to play or record after a power-up delay T_{PUD}.*
4. *The part must have $\overline{CE}$ HIGH for a debounce period T_{DB} before it will recognize another falling edge of $\overline{CE}$ and pause.*
5. *The second $\overline{CE}$ LOW pulse, and every even pulse thereafter, performs a Pause function.*
6. *Again, the part must have $\overline{CE}$ HIGH for a debounce period T_{DB} before it will recognize another falling edge of $\overline{CE}$, which would restart an operation. In addition, the part will not do an internal power down until $\overline{CE}$ is HIGH for the T_{DB} time.*
7. *The third $\overline{CE}$ LOW pulse, and every odd pulse thereafter, performs a Resume function.*
8. *At any time, a HIGH level on PD will stop the current function, reset the address counter, and power down the device.*

PHYSICAL DIMENSIONS

Figure 9: 28-Lead 0.600-Inch Plastic Dual Inline Package (PDIP) (P)

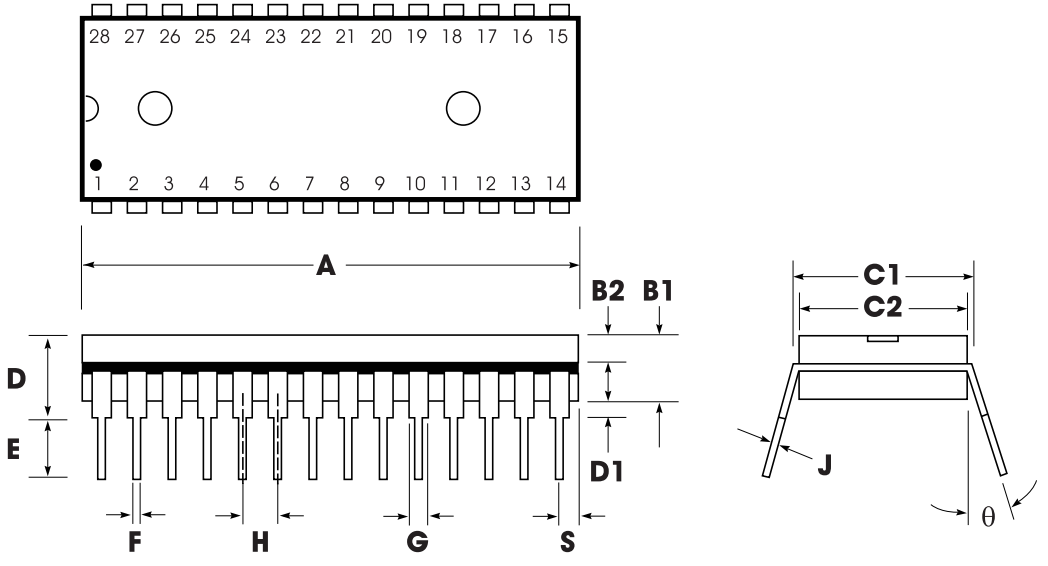


Table 17: Plastic Dual Inline Package (PDIP) (P) Dimensions

	INCHES			MILLIMETERS		
	Min	Nom	Max	Min	Nom	Max
A	1.445	1.450	1.455	36.70	36.83	36.96
B1		0.150			3.81	
B2	0.065	0.070	0.075	1.65	1.78	1.91
C1	0.600		0.625	15.24		15.88
C2	0.530	0.540	0.550	13.46	13.72	13.97
D			0.19			4.83
D1	0.015			0.38		
E	0.125		0.135	3.18		3.43
F	0.015	0.018	0.022	0.38	0.46	0.56
G	0.055	0.060	0.065	1.40	1.52	1.65
H		0.100			2.54	
J	0.008	0.010	0.012	0.20	0.25	0.30
S	0.070	0.075	0.080	1.78	1.91	2.03
q	0°		15°	0°		15°

Figure 10: 28-Lead 0.300-Inch Plastic Small Outline Integrated Circuit (SOIC) (S)

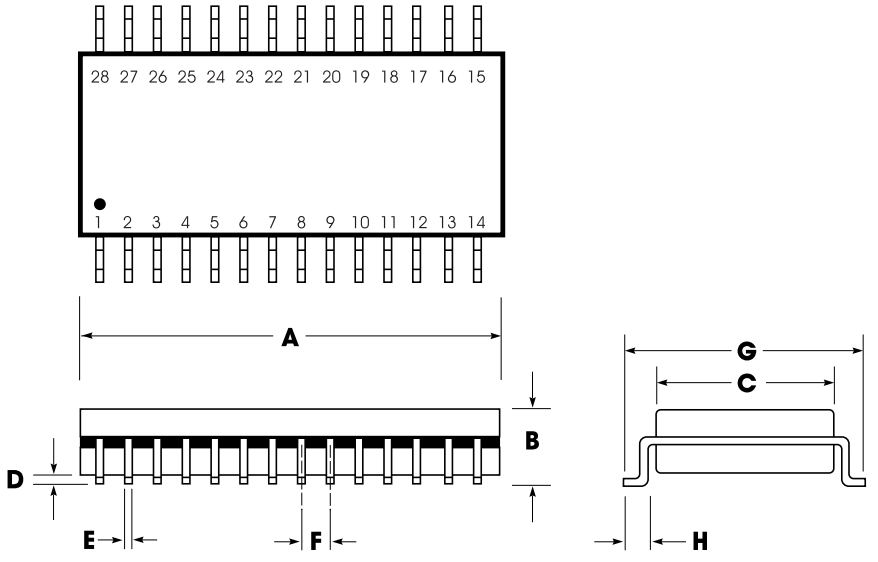


Table 18: Plastic Small Outline Integrated Circuit (SOIC) (S) Dimensions

	INCHES			MILLIMETER		
	Min	Nom	Max	Min	Nom	Max
A	0.701	0.706	0.711	17.81	17.93	18.06
B	0.097	0.101	0.104	2.46	2.56	2.64
C	0.292	0.296	0.299	7.42	7.52	7.59
D	0.005	0.009	0.0115	0.127	0.22	0.29
E	0.014	0.016	0.019	0.35	0.41	0.48
F		0.050			1.27	
G	0.400	0.406	0.410	10.16	10.31	10.41
H	0.024	0.032	0.040	0.61	0.81	1.02

NOTE: *Lead coplanarity to be within 0.004 inches.*

Figure 11: 32-Lead 8x20mm Plastic Thin Small Outline Package (TSOP) Type I (T)

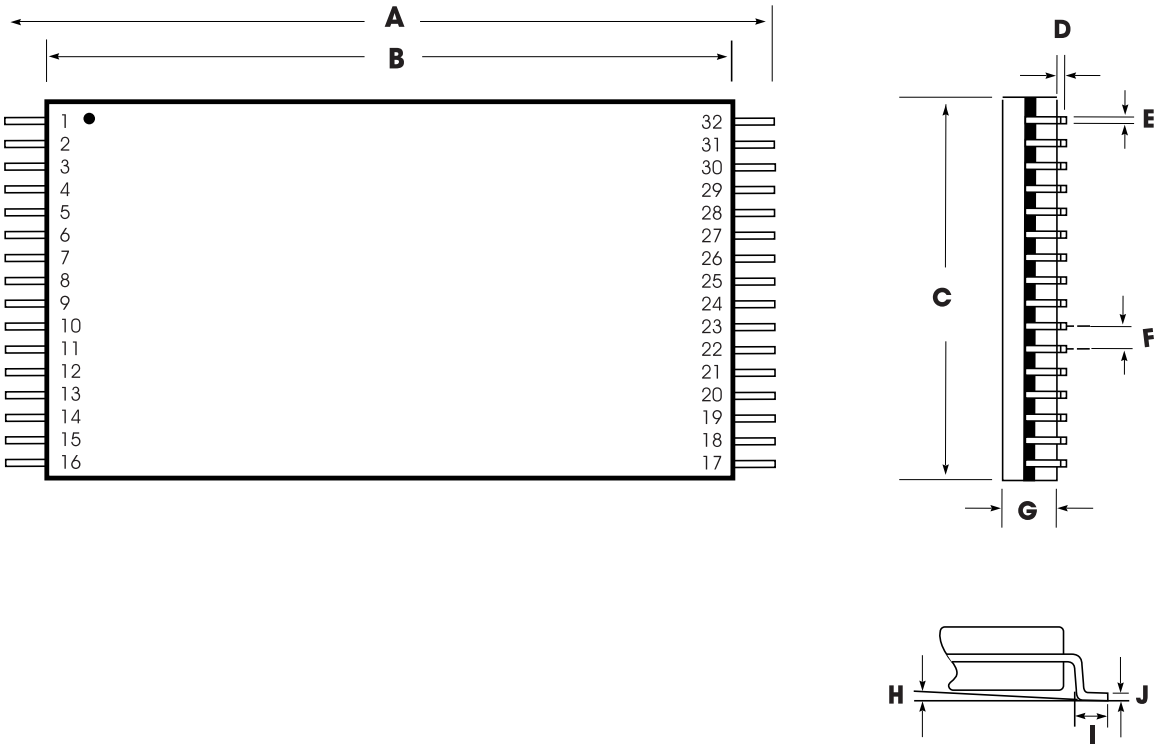


Table 19: Plastic Thin Small Outline Package (TSOP) Type I (T) Dimensions

	INCHES			MILLIMETERS		
	Min	Nom	Max	Min		Max
A	0.780	0.787	0.795	19.80	20.00	20.20
B	0.720	0.724	0.728	18.30	18.40	18.50
C	0.311	0.315	0.319	7.90	8.00	8.10
D	0.002		0.006	0.05		0.15
E	0.006	0.009	0.011	0.17	0.22	0.27
F		0.0197			0.50	
G	0.037	0.039	0.041	0.95	1.00	1.05
H	0°	3°	5°	0°	3°	5°
I	0.020	0.024	0.028	0.50	0.60	0.70
J	0.004		0.008	0.10		0.21

NOTE: *Lead coplanarity to be within 0.002 inches.*

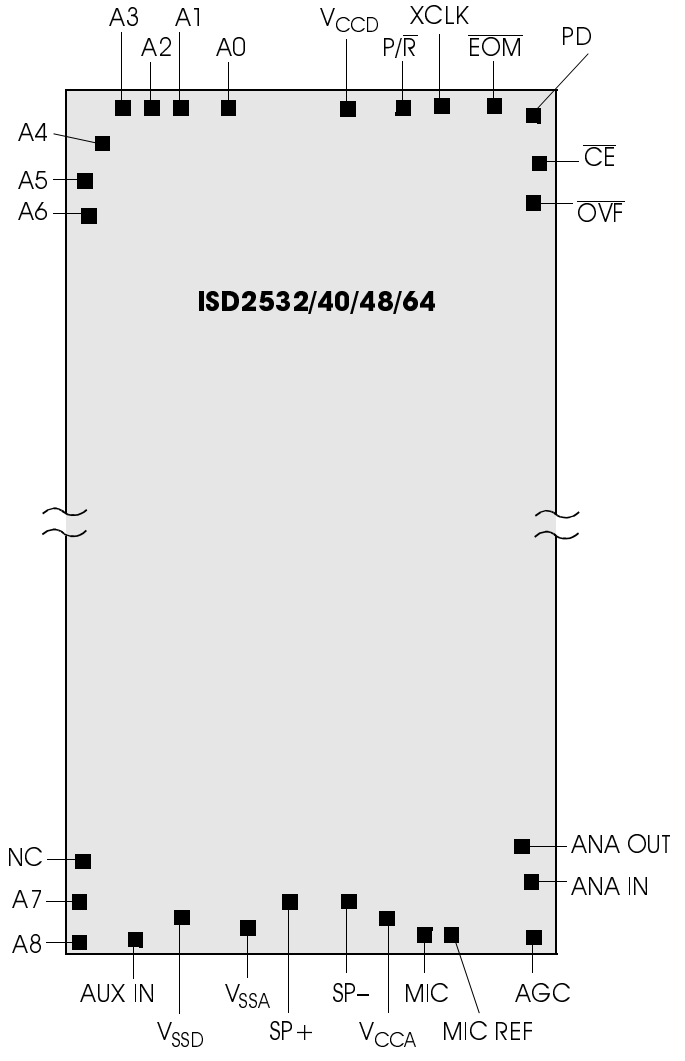
Figure 12: ISD2532/40/48/64 Products Bonding Physical Layout (Unpackaged Die)[1]

ISD2532/40/48/64

I. Die Dimensions
X: 149.6 ±1 mils
Y: 206.3 ±1 mils

II. Die Thickness[2]
11.8 ±.4 mils

III. Pad Opening
111 microns (4.4 mils)



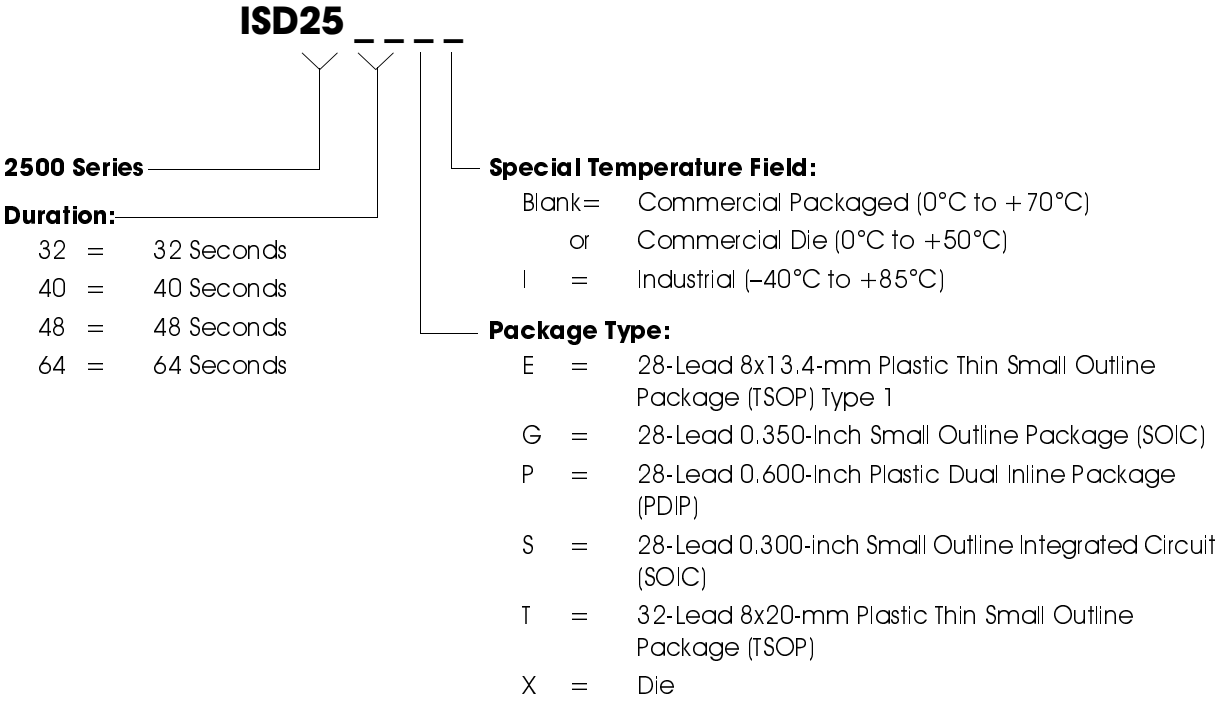
1. *The backside of die is internally connected to V_{SS}. It **MUST NOT** be connected to any other potential or damage may occur.*
2. *Die thickness is subject to change, please contact ISD factory for status and availability.*

Table 20: ISD2532/40/48/64 Products Pin/Pad Designation, with Respect to Die Center (µm)

Pin	Pin Name	X Axis	Y Axis
A0	Address 0	–896.55	2425.13
A1	Address 1	–1114.05	2425.13
A2	Address 2	–1329.68	2425.13
A3	Address 3	–1542.68	2425.13
A4	Address 4	–1639.05	2178.75
A5	Address 5	–1696.80	1960.88
A6	Address 6	–1696.80	1731.38
NC	No Connect	–1729.80	–1875.75
A7	Address 7	–1729.80	–2061.00
A8	Address 8	–1729.80	–2343.38
AUX IN	Auxiliary Input	–1408.80	–2408.25
V_{SSD}	V_{SS} Digital Power Supply	–1111.43	–2388.75
V_{SSA}	V_{SS} Analog Power Supply	–406.43	–2431.13
SP+	Speaker Output +	–46.05	–2360.25
SP–	Speaker Output –	388.20	–2360.25
V_{CCA}	V_{CC} Analog Power Supply	747.83	–2403.00
MIC	Microphone Input	1102.58	–2438.63
MIC REF	Microphone Reference	1296.08	–2438.63
AGC	Automatic Gain Control	1667.70	–2422.88
ANA IN	Analog Input	1729.95	–1946.63
ANA OUT	Analog Output	1702.20	–1703.63
$\overline{OVF}$	Overflow Output	1675.95	1779.38
$\overline{CE}$	Chip Enable Input	1728.08	2114.25
PD	Power Down Input	1731.83	2383.88
$\overline{EOM}$	End of Message	1342.20	2411.63
XCLK	No Connect (optional)	987.83	2450.63
P/$\overline{R}$	Playback/Record	808.58	2453.25
V_{CCD}	V_{CC} Digital Power Supply	546.08	2449.13

ORDERING INFORMATION

Product Number Descriptor Key



When ordering ISD2532/40/48/64 products refer to the following part numbers which are supported in volume for this product series. Consult the local ISD Sales Representative or Distributors for availability information.

Part Number	Part Number	Part Number	Part Number
ISD2532E	ISD2540E	ISD2548E	ISD2564P
ISD2532EI	ISD2540EI	ISD2548P	ISD2564X
ISD2532P	ISD2540P	ISD2548X	
ISD2532PI	ISD2540PI		
ISD2532S	ISD2540S		
ISD2532SI	ISD2540SI		
ISD2532X	ISD2540X		

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