



Quadruple Operational Comparator

LM324QD

Description

The LM324QD consists of four independent high gain, internally frequency compensated operational amplifiers which are designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

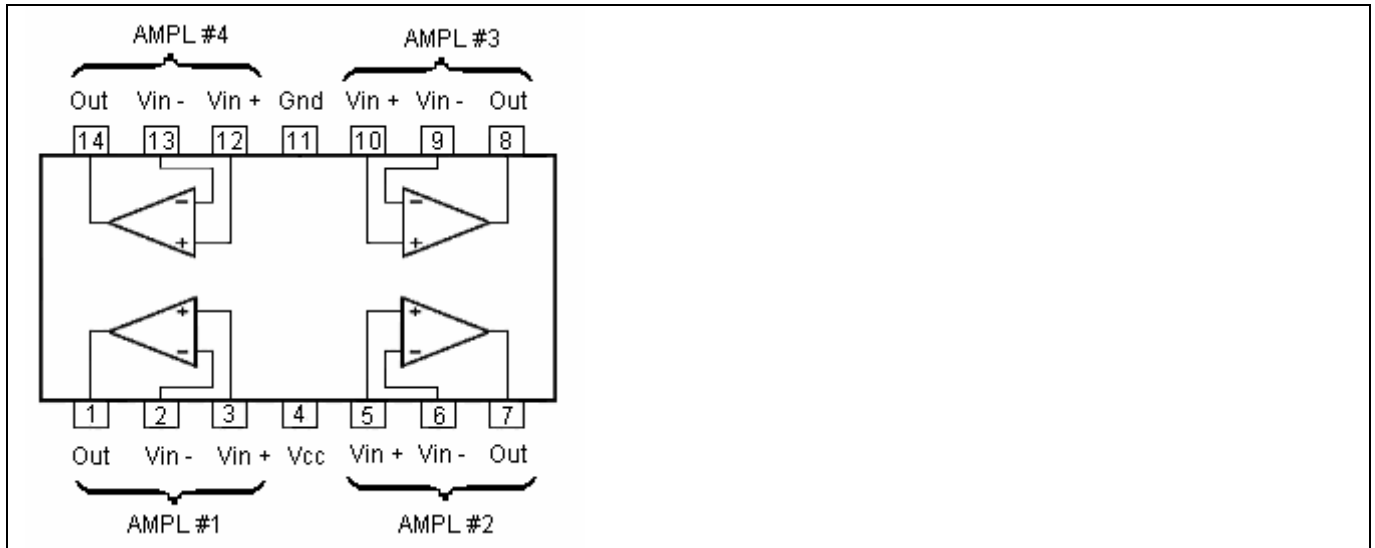
Features

- Wide range of supply voltages
- Low supply current drain independent of supply voltage
- Low input biasing current
- Low input offset voltage and offset current
- Differential input voltage range equal to the power supply voltage
- Input common-mode voltage range includes ground
- DC voltage gain 100V/mV typ
- Internally frequency compensation

Applications

- General purpose amplifier
- Transducer amplifier
- DC gain block

Pin Configurations



Absolute Maximum Rating(Ta=25°C)

Parameter	Symbol	Value	Unit
Power Supply Voltages			
Single Supply	V _{CC}	32	V
Split Supplies	V _{CC} , V _{EE}	±16	
Input Differential Voltage Range	V _{IDR}	±32	V
Input Common Mode Voltage Range	V _{ICR}	-0.3 ~ +32	V
Operating Temperature	T _{opr}	0 ~ +70	°C
Storage Temperature	T _{stg}	-65 ~ +150	°C

Electrical Characteristics (V_{CC}=5V, T_a=25°C, V_{EE}=GND, unless otherwise specified.)

Parameter	Test Condition	Symbol	Min.	Typ.	Max.	Unit
Input Offset Voltage	V _{CC} =5 to 30V V _{IC} =V _{ICR} min, V _O =1.4V	25°C	-	3	7	mV
		0~70°C		-	9	
Average temperature coefficient of input offset voltage		αV _{IO}	-	7	-	μV/°C
Input Offset Current	V _O =1.4V	25°C	-	2	50	nA
		0~70°C		-	150	
Average temperature coefficient of input offset current		αI _{IO}	-	10	-	pA/°C
Input Bias Current	V _O =1.4V	25°C	-	-20	-250	nA
		0~70°C		-	-500	
Input Common-Mode Voltage	V _{CC} =5V to 30V	25°C	V _{ICR}	0 to V _{CC} -1.5	-	V
		0~70°C		0 to V _{CC} -2	-	

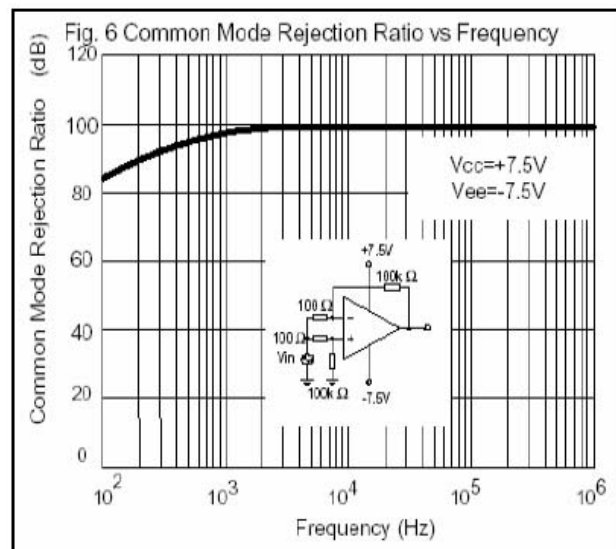
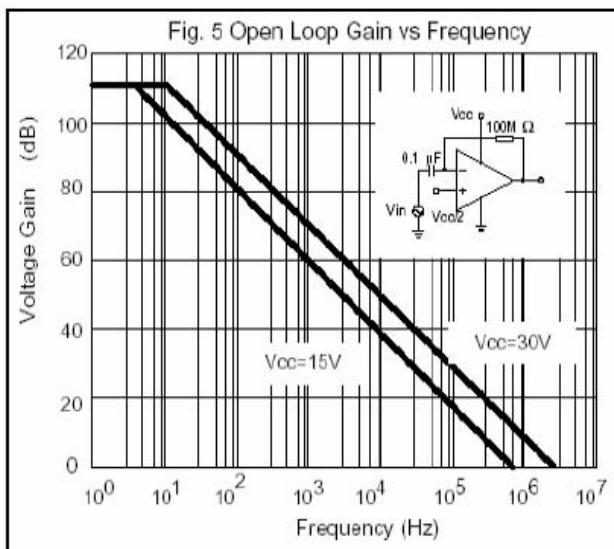
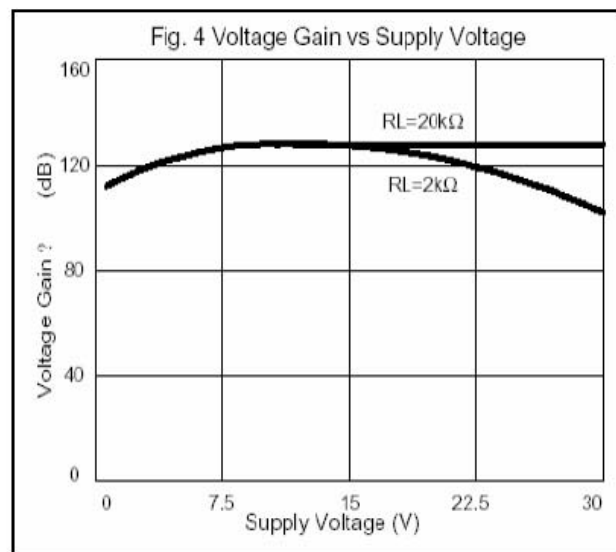
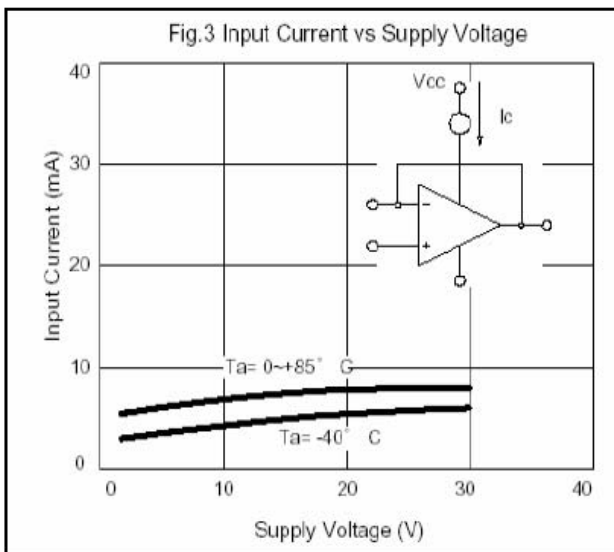
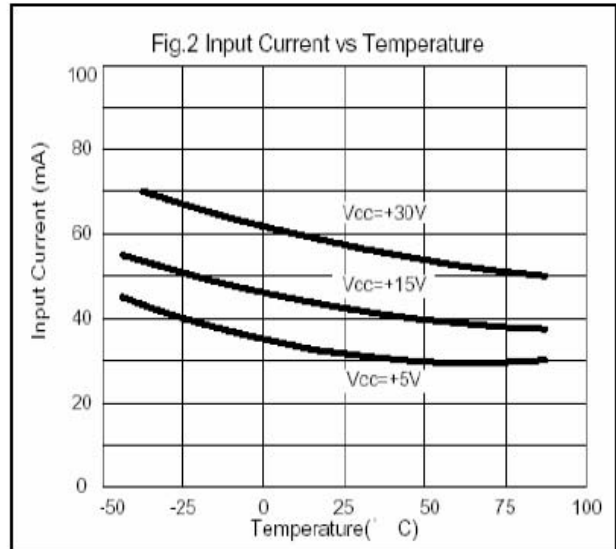
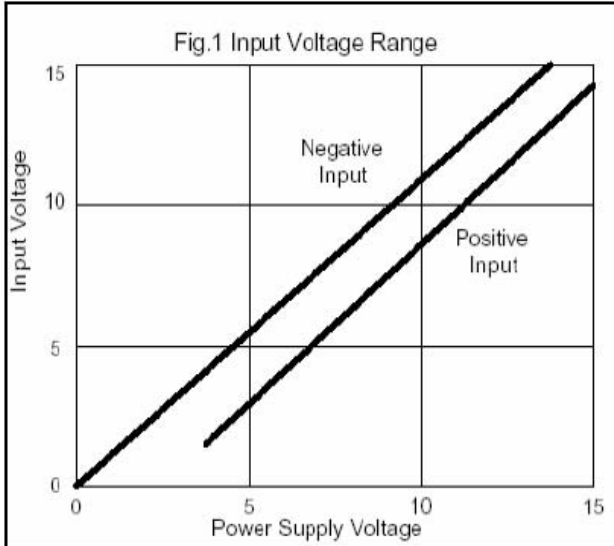


Power Supply Current (four amplifiers)	Ro=2.5V, no load	0~70°C	I _{CC}	-	1.5	2.4	mA
	V _{CC} =30V, V _O =0.5V _{CC} , no load	0~70°C		-	1.1	3	mA
Large Signal Differential Voltage Amplification	V _{CC} =15V, V _{O(p)} =1V to 11V, R _L ≥2kΩ	25°C	A _{VD}	25	100	-	V/mV
		0~70°C		15	-	-	
High Level Output Voltage	R _L =2kΩ	25°C	V _{OH}	V _{CC} -1.5	-	-	V
	V _{CC} =30V, R _L =2kΩ	0~70°C		26	-	-	
	V _{CC} =30V, R _L =10kΩ	0~70°C		27	28	-	
Low Level Output Voltage	R _L =10kΩ	0~70°C	V _{OL}	-	5	20	mV
Common Mode Rejection Ratio	V _{CC} =5V to 30V V _{IC} =V _{ICR} min	25°C	CMRR	65	80	-	dB
Power Supply Rejection Ratio	V _{CC} =5V to 30V	25°C	PSRR	65	100	-	dB
Channel Crosstalk Attenuation	f=1kHz to 20kHz	25°C	CS	-	120	-	dB
Short Circuit Output Current	V _{CC} at 5V, GND at -5V, V _O =0V	25°C	I _{SC}	-	±40	±60	mA
Output Current	V _{CC} =15V, V _{ID} =1V, V _O =0V	25°C	I _O	-20	-30	-	mA
		0~70°C		-10	-	-	
	V _{CC} =15V, V _{ID} =-1V, V _O =15V	25°C		10	20	-	mA
		0~70°C		5	-	-	
V _{ID} =-1V, V _O =0.2V	25°C	12	30	-	μA		

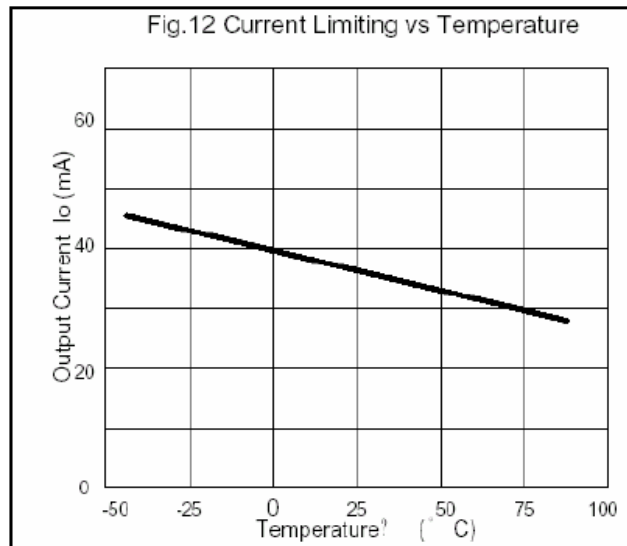
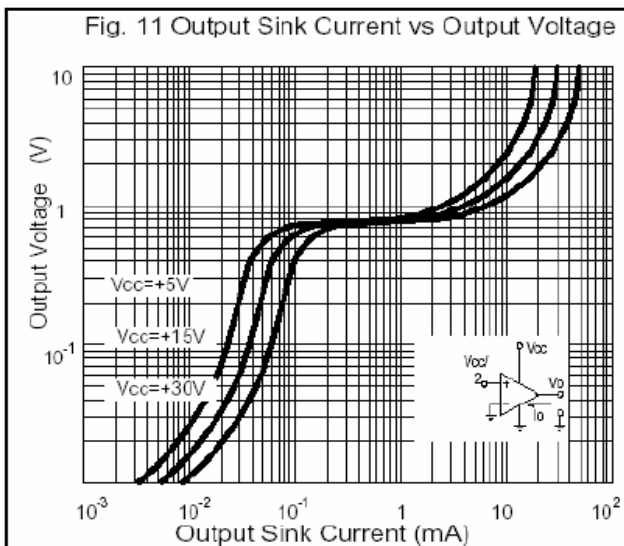
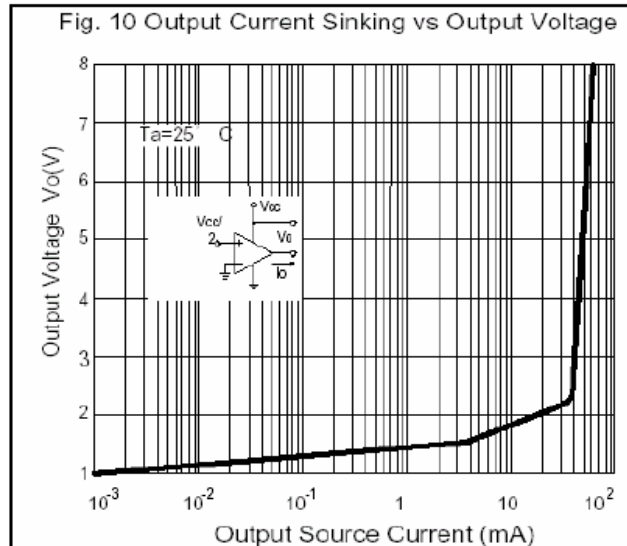
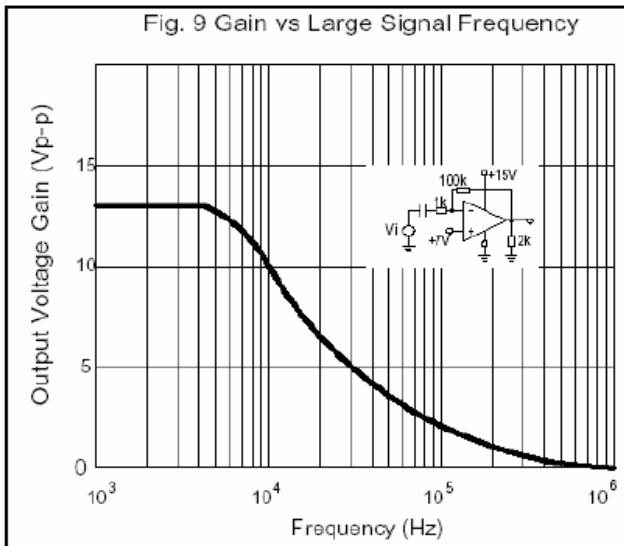
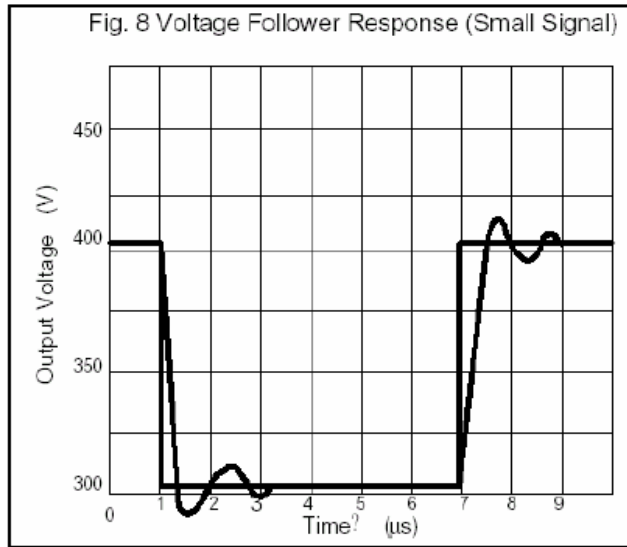
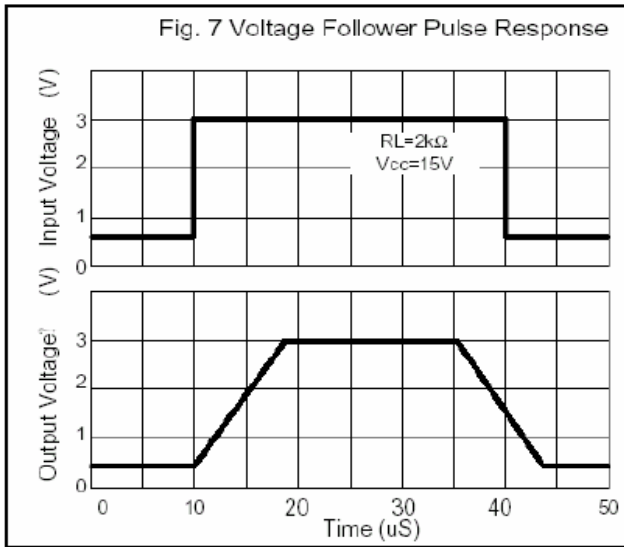
Ordering Information

Device	Package	Shipping
LM324QD-0-T3-G	SOP-14 (Pb-free lead plating and halogen-free package)	2500 pcs/ Tape & Reel

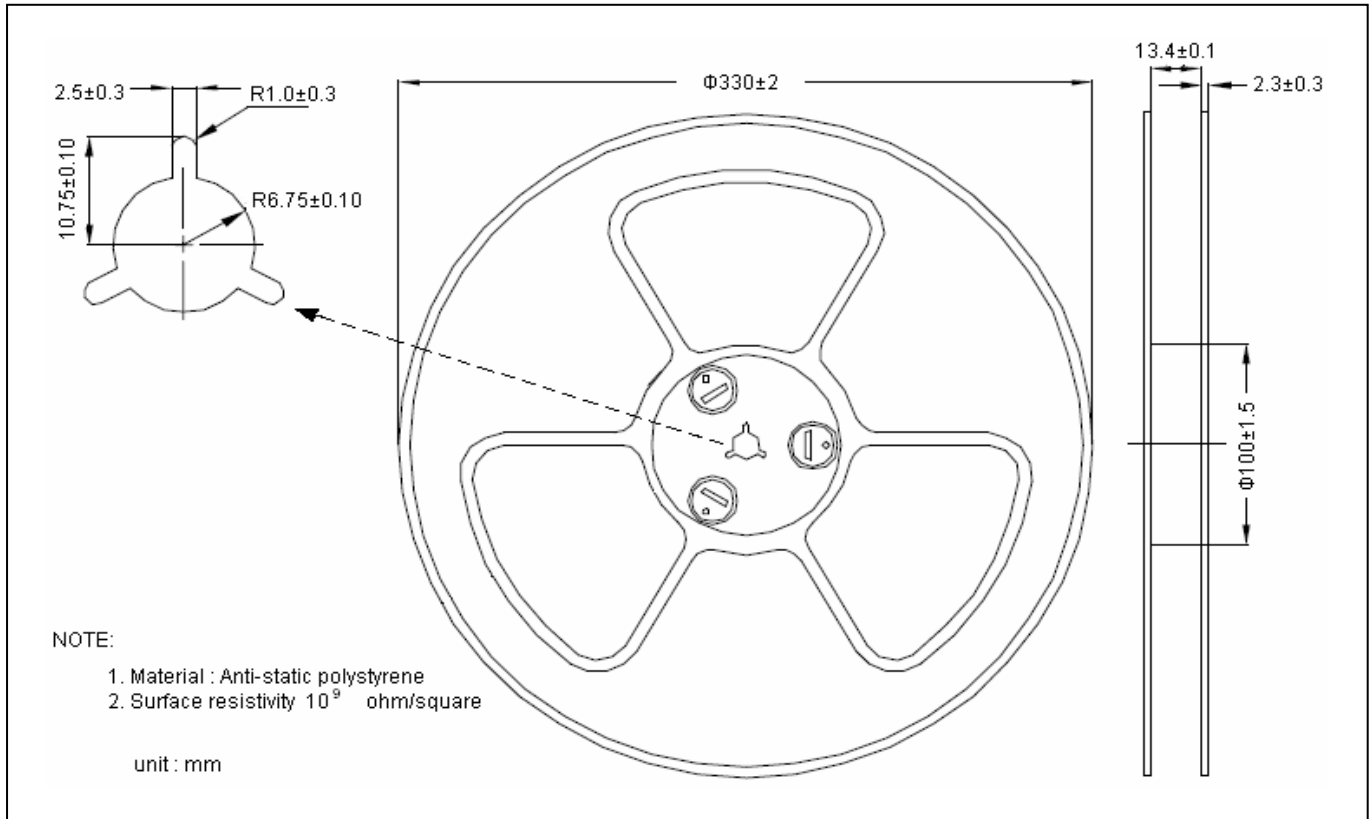
Characteristic Curves, each channel



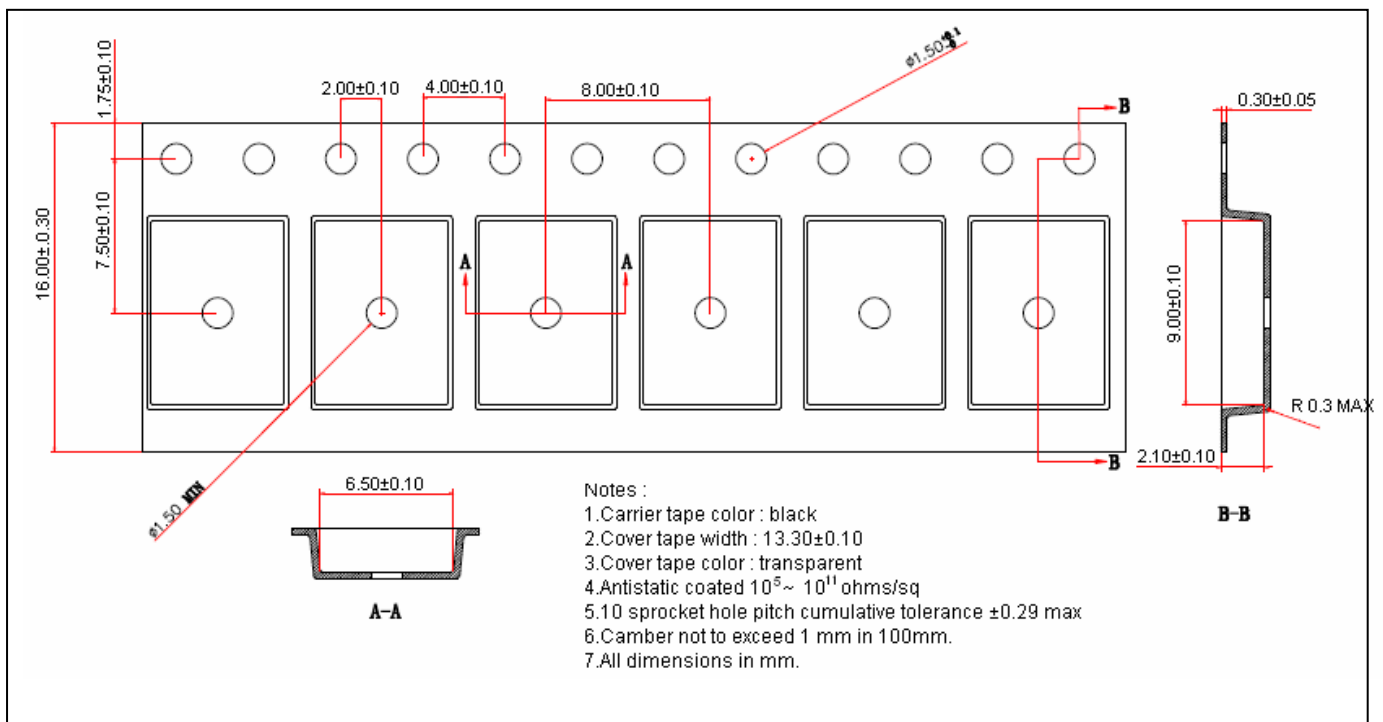
Characteristic Curves, each channel(Cont.)



Reel Dimension



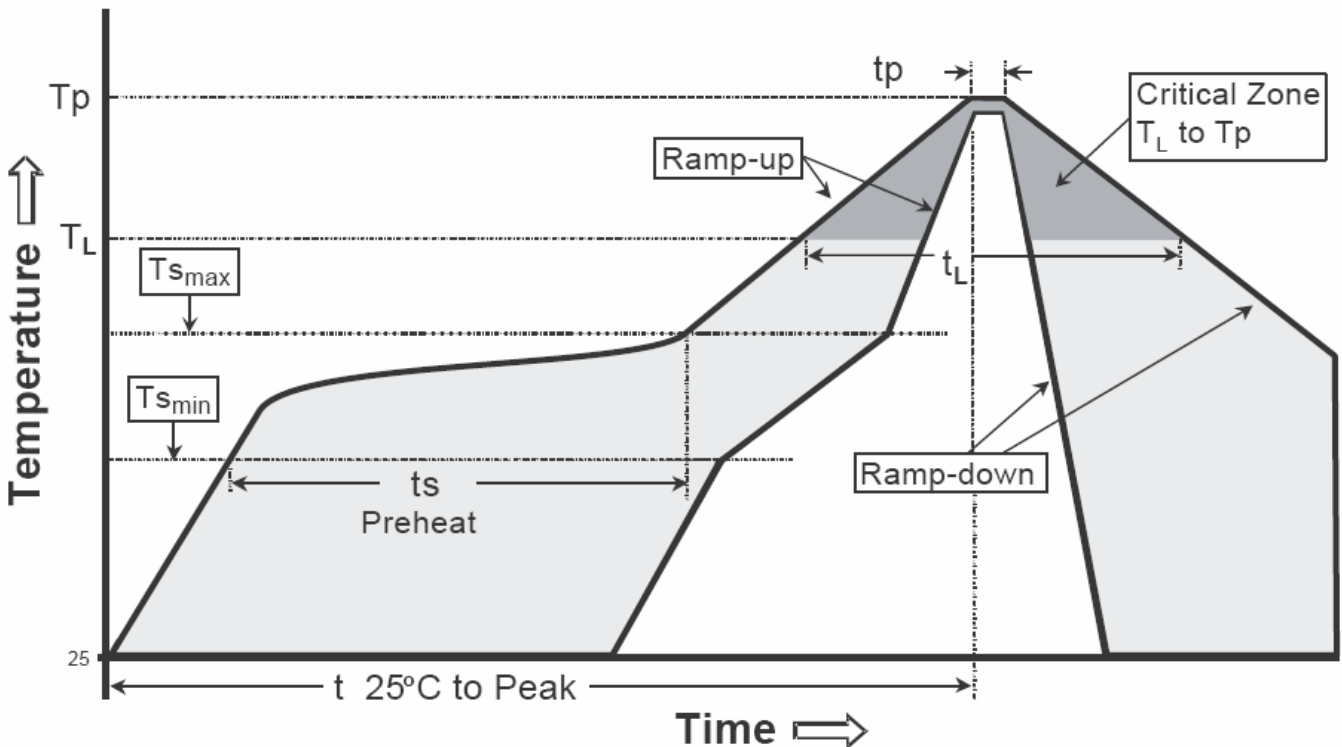
Carrier Tape Dimension



Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

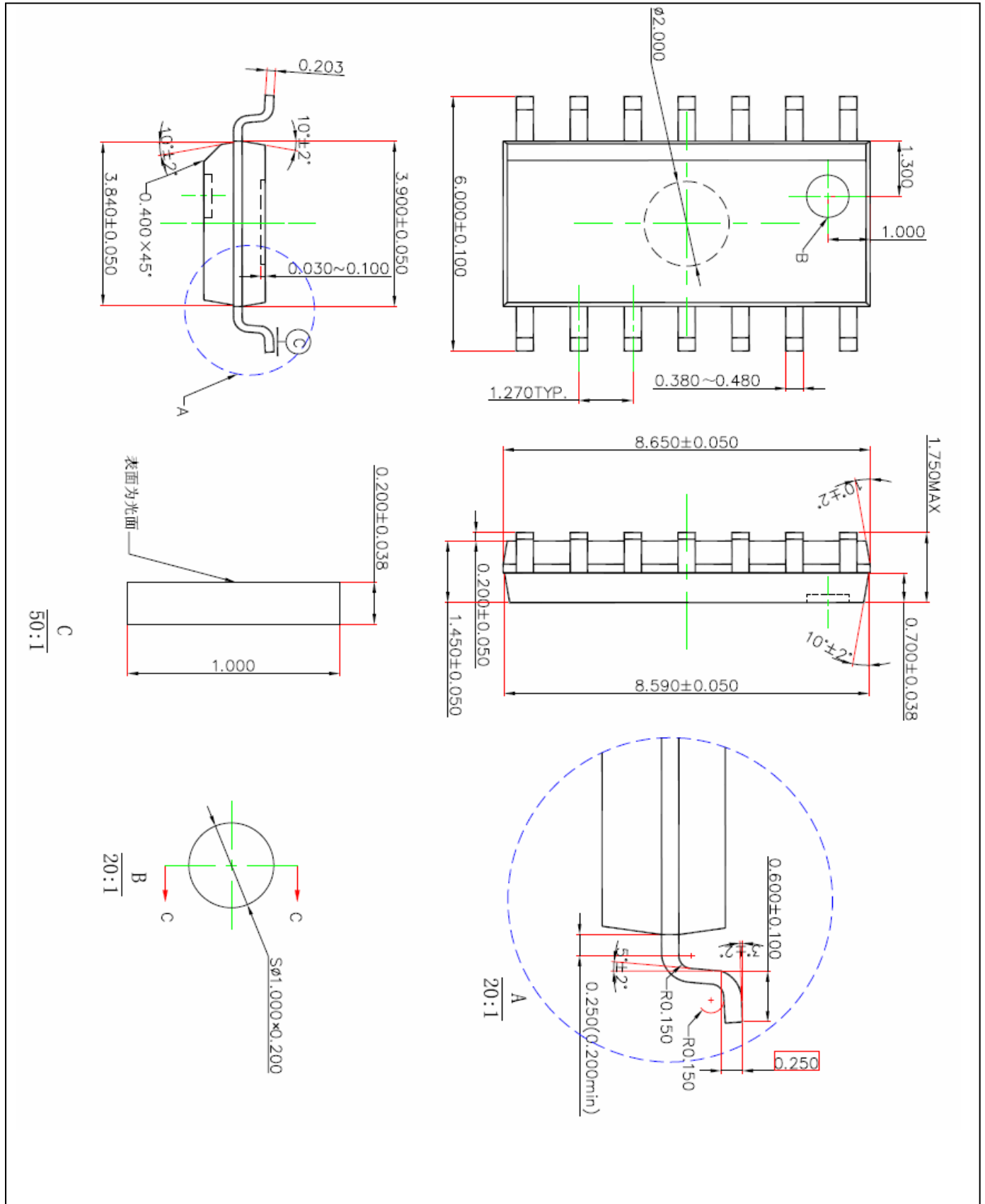
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	60-150 seconds
Peak Temperature(T _P)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(t _p)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

SOP-14 Dimension

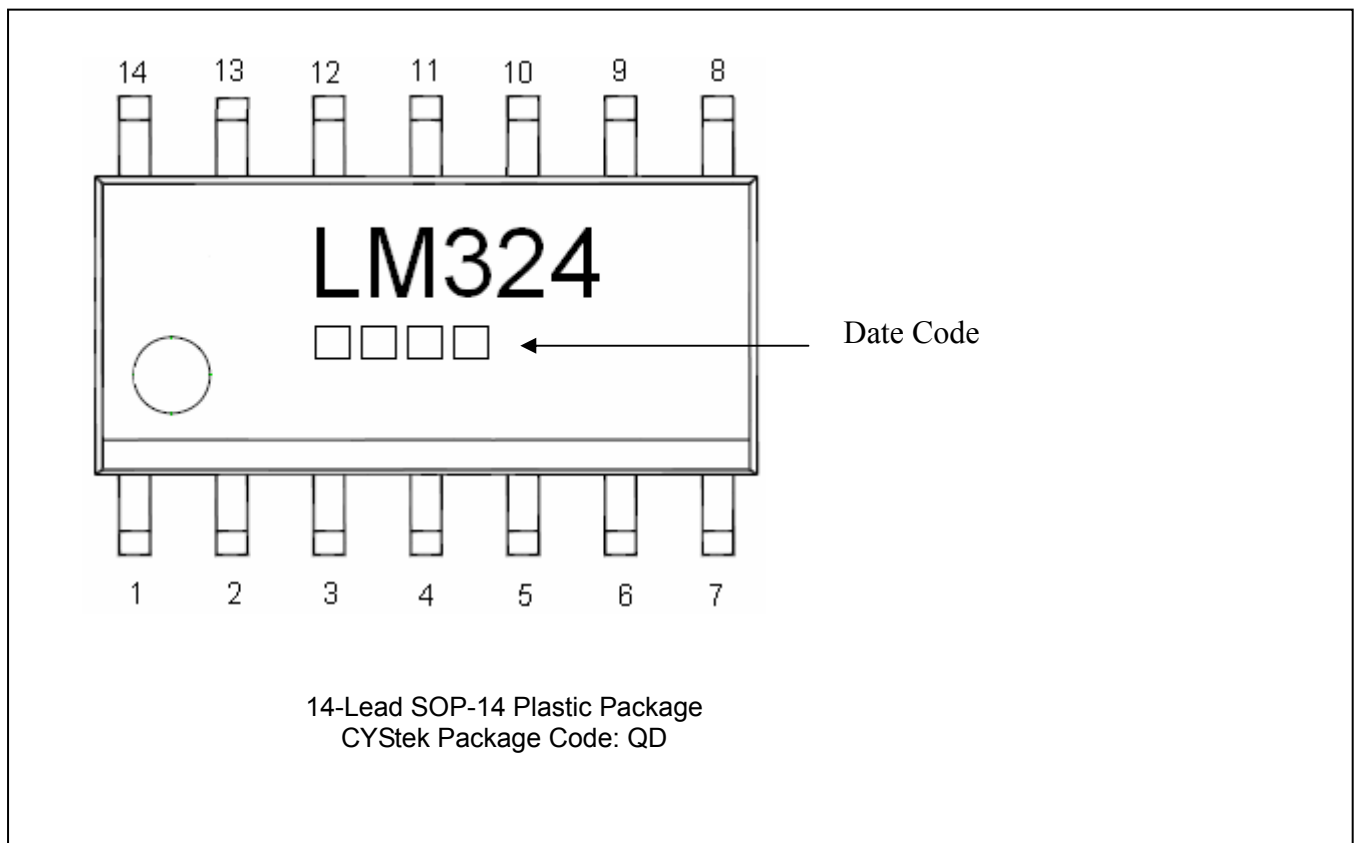


Notes: 1.Controlling dimension: millimeters.
 2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
 3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

Marking



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