V575M LINEAR INTEGRATED CIRCUIT

LOW VOLTAGE COMPANDOR

DESCRIPTION

The V575M is a precision dual gain control circuit designed for low voltage applications .The V575M's channel 1 is an expandor ,while channel 2 can be configured either for expandor ,compressor,or automatic level controller (ALC) application.

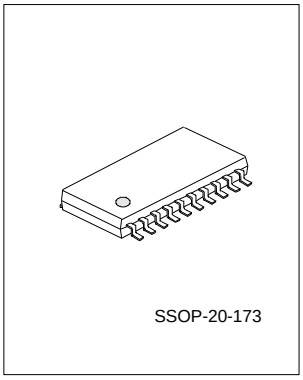


Figure 1. 3-Dimention Outline

FEATURE

* Operating voltage range from 3V to 7V
* Reference voltage of 100mV$_{RMS}$ =0dB
* One dedicated summing op amp per channel and two extra uncommitted op amps
* 600 Ω drive capability
* Single or split supply operation
* Wide input/output swing capability
* 3000V ESD protection

APPLICATION

* Protable communications
* Cellular radio
* Cordless telephone
* Protable broadcast mixers
* Wireless microphones
* Modems
* Electric organs
* Hearing aids
* Consumer audio

BLOCK DIAGRAM

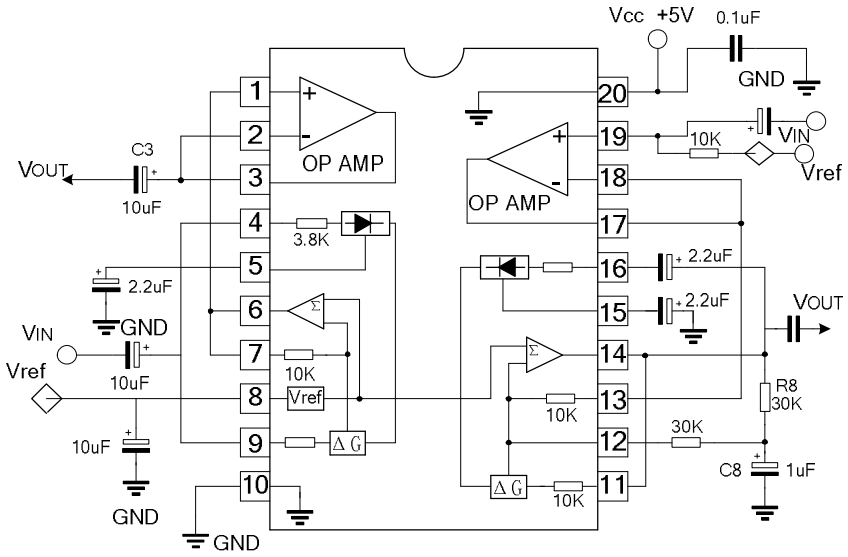


Figure 2. Block Diagram and Test Circuit

ABSOLUTE MAXIMUM RATINGS

(Unless otherwise noted ,all is over operating free-air temperature Range)

Characteristic	Symbol	Value	Unit
Single supply voltage	V_{CC}	-0.3 to 8	V
Voltage applied to any other pin	V_{IN}	-0.3 to (Vcc+0.3)	V
Operating ambient temperature range	T_A	-40 to +85	℃
Storage temperature range	T_{STG}	-65 to +150	℃
Thermal impedance	θ_{JA}	117	℃/W

DC ELECTRICAL CHARACTERISTICS

(Typical values are at TA=25℃.Minimum and Maximum values are for the full operating temperature range: -40 to +85℃ for V575M,Vcc=5V,unless otherwise stated.)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
For compandor,including summing amplifier						
Supply voltage 1	Vcc		3	5	7	V
Supply current	Icc	No signal	3	4.2	5.5	mA
Reference voltage2	V_{REF}	Vcc=5V	2.4	2.5	2.6	V
Summing amp output Load	R_L		10			KΩ
Total harmonic distortion	THD	1KZ,0dB BW=3.5KHZ		0.12	1.5	%
Output voltage noise	E_{NO}	BW=20KHZ,Rs=0Ω		6	30	uV
Unity gain level	0dB	1KHZ	-1.5		+1.5	dB
Output voltage offset	V_{OS}	NO signal	-150		150	mV
Output DC shift		No signal to 0dB	-100		100	mV
Tracking error relative to 0dB		Gain cell input=0dB,1KHZ Rectifier input =6dB,1kHZ	-1.0		1.0	dB
		Gain cell input=0dB,1KHZ Rectifier input =-30dB,1kHZ	-1.0		1.0	dB
For operational amplifier						
Output swing	V0	RL=10KΩ	Vcc-0.4	Vcc		V
Output load	RL	1KHZ	600			Ω
Input common-mode range	CMR		0			V
Common-mode rejection ratio	CMRR		60	80		dB
Input bias current	I_B	V_{IN}=0.5V to 4.5V	-1		1	uA
Input offset voltage	Vos			3		mV
Open-loop gain	A_{VOI}	R_L=10kΩ		80		dB
Slew rate	SR	Unity gain		1		V/us
Bandwidth	GBW	Unity gain		3		MHZ
Input voltage noise	E_{NI}	BW=20KHZ		2.5		uV
Power supply rejection ratio	PSRR	1KHZ,250mV		60		dB

NOTES:

1. Operation down to Vcc=2V is possible,but performance is reduced.See curves in Figure 7a and 7b.
2. Reference voltage ,V_{REF} ,is typically at 1/2Vcc.

FUNCTION DESCRIPTION

This section describes the basic subsystems and applications of the V575M Compandor.More theory of operation on compandors can be found in AN174 and AN176 .The typical applications of the V575M low voltage compandor in an Expandor(1:2), Compressor(2:1) and Automatic Level Control (ALC)function are explained. These three circuit configurations are shown in Figures3,4,5 respectively.

The V575M has two channels for a complete companding system.The left channel,A, can be configured as a 1:2 Expandor while the right channel ,B,can be configured as either a 2:1 Compressor ,a 1:2Expandor or an ALC.Each channel consists of the basic companding building blocks of rectifier cell,variable gain cell,summing amplifier and VREF cell. In addition ,the V575M has two additional high performance uncommitted op amps which can be utilized for application such as filtering ,pre-emphasis/de- emphasis or buffering.

Figure 6 shows the complete schematic for the applications demo board .Channel A is configured as an expandor while channel B is configured so that is can be used either as a compressor or as an ALC circuit. The switch ,S1,toggles the circuit between compressor and ALC mode.Jumpers J1and J2 can be used to either include the additional op amps for signal conditioning or exclude them from the signal path.Bread boarding space is provided for R1,R2,C1,C2,R10,R11,C10and C11 so that the response can be tailored for each individual need.The components as specified are suitable for the complete audio spectrum from 20HZ to 20KHZ.

The most common configuration is as a unity gain non-inverting buffer where R1,C1,C2,R10,C10and C11 are eliminated and R2 and R11 are shorted .Capacitors C3,C5,C8,and C12 are for DC blocking .In systems where the inputs and outputs are AC coupled,these capacitors and resisitors can be eliminated.Capacitors C4 and C9 are for setting the attack and release time constant.

C6 is for decoupling and stabilizing the voltage reference circuit.The value of C6 should be such that it will offer a very low impedance to the lowest frequencies of interest. Too small a capacitor will allow supply ripple to modulate the audio path.The better filtered the power supply,the smaller this capacitor can be. R12 provides DC reference voltage to the amplifier of channel B. R6 and R7 provide a DC feedback path for the summing amp of channel B,while C7 is a short-circuit to ground for signals. C14 and C15 are for power supply decoupling. C14 can also be eliminated if the power supply is well regulated with very low noise and ripple.

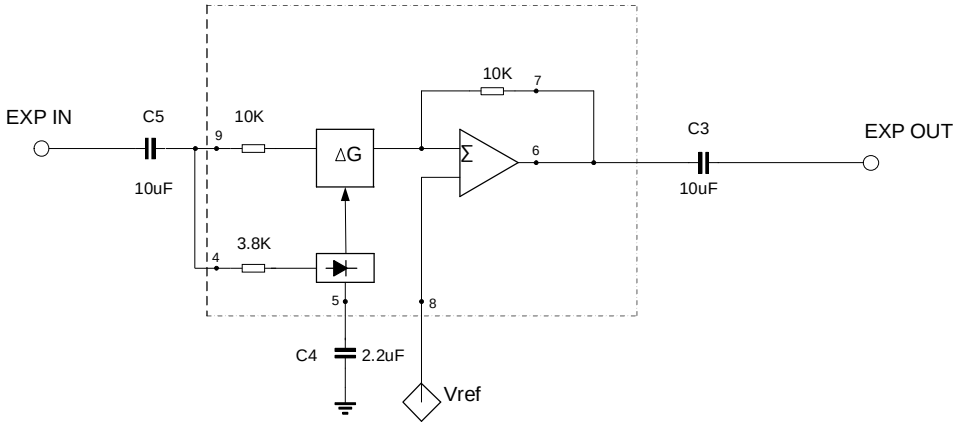


Figure 3. Typical Expandor Configuration

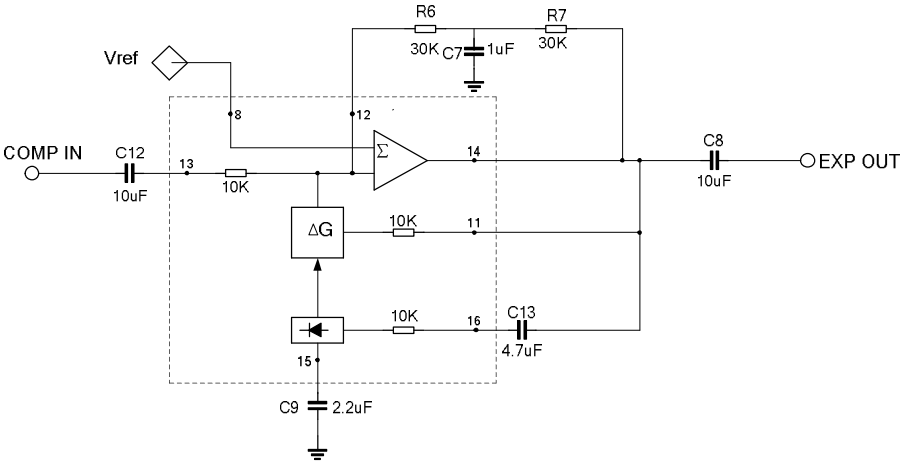


Figure4. Typical Compressor Configuration

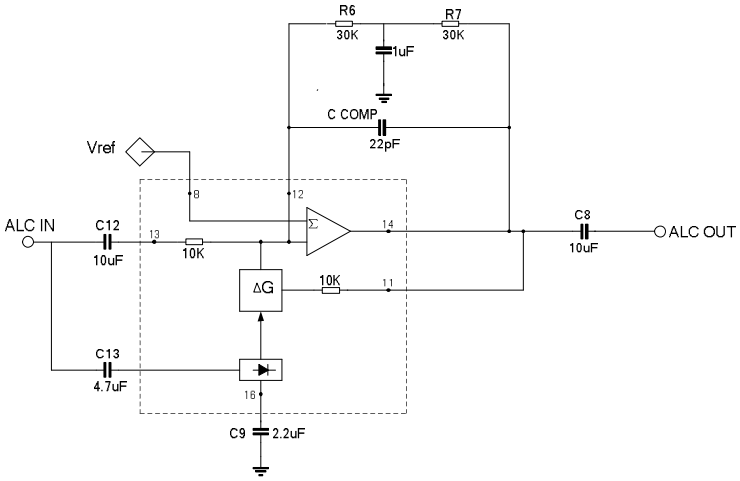


Figure5. Typical ALC Configuration

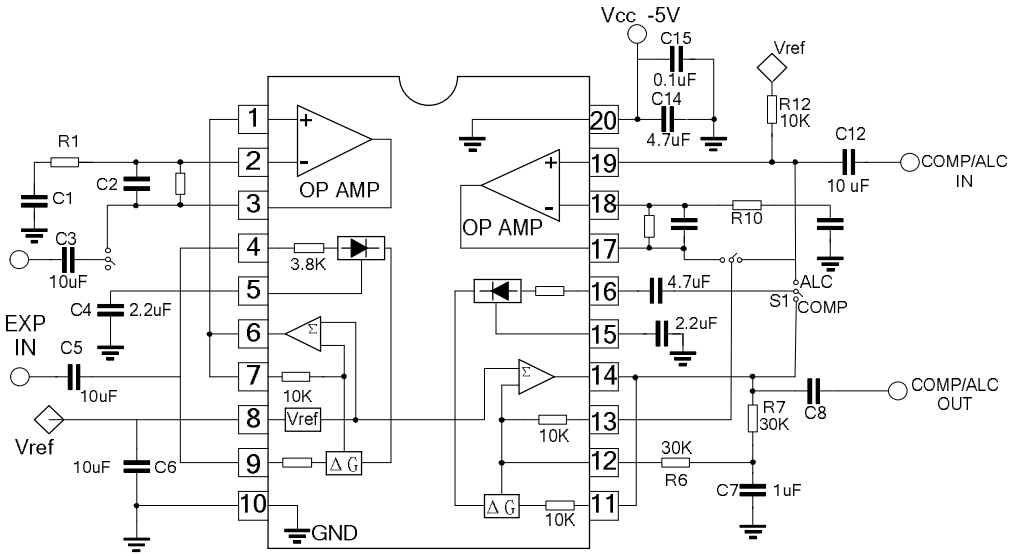
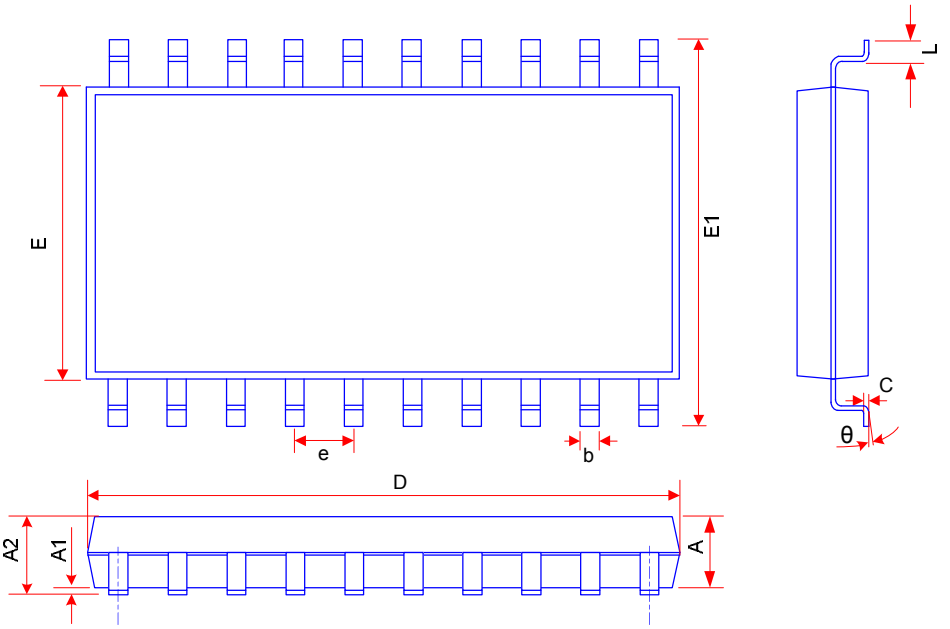


Figure6. V575M Low Voltage EXpandor/Compressor/ALC Demo Board

PACKAGE OUTLINE

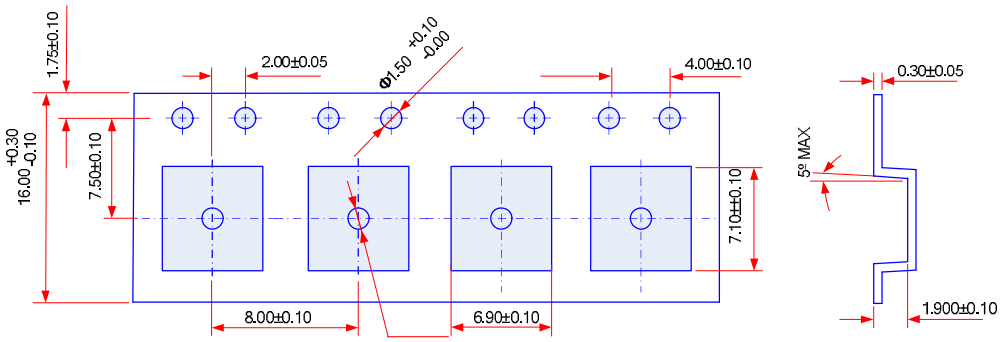
SSOP-20-173-0.65 UNIT: mm



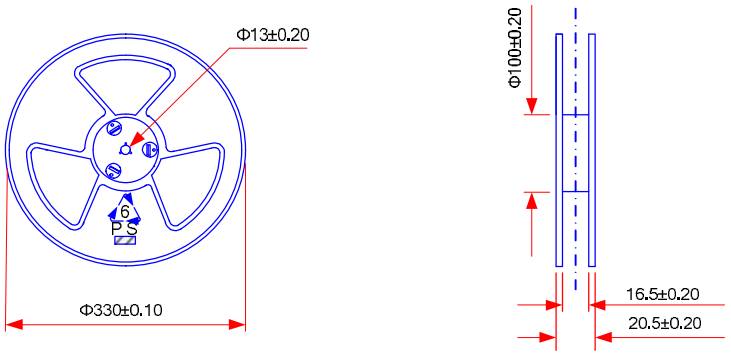
Symbol	Min (mm)	Max(mm)
A	-	1.450
A1	0.050	0.200
A2	1.150	1.250
b	0.200	0.310
c	0.090	0.200
D	6.300	6.700
E	4.300	4.500
E1	6.200	6.600
L	0.450	0.750
θ	0°	8°
e	0.65BSC	

V575M T&R PACKAGE GRAPHICS (UNIT: mm)	DATE	2006-02-17
	MADE BY	
	AUDITOR	
	APPROVED BY	

1.TAPE

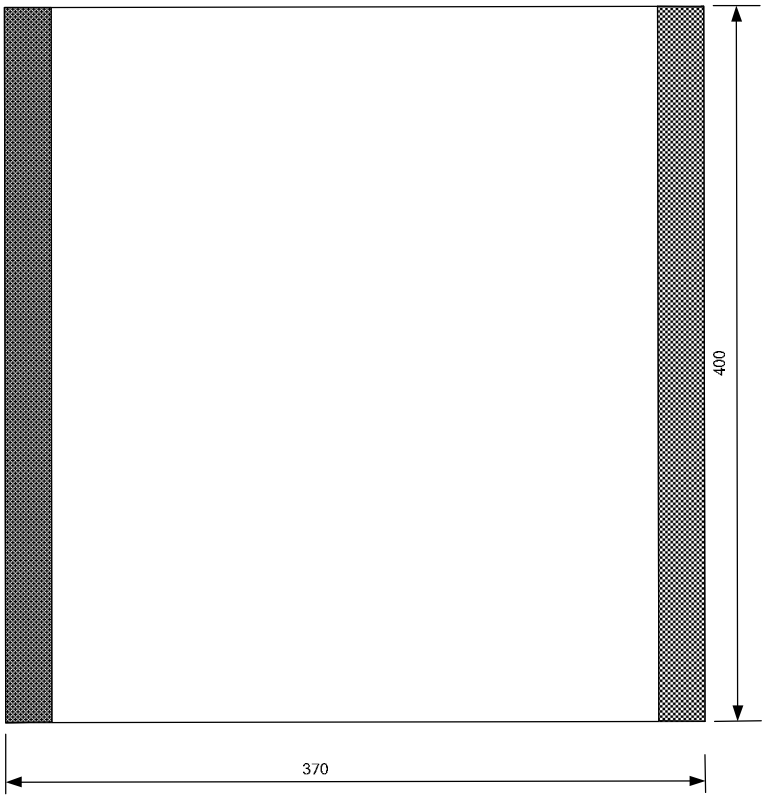


2.REEL



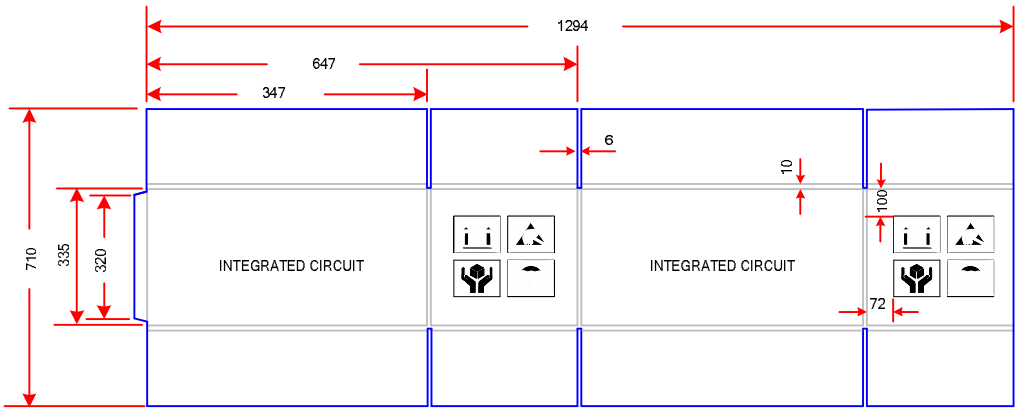
V575M	DATE	2006-02-17
	MADE BY	
	AUDITOR	
T&R PACKAGE GRAPHICS (UNIT: mm)	APPROVED BY	

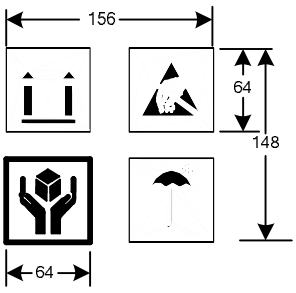
3. PLASTIC POCKET

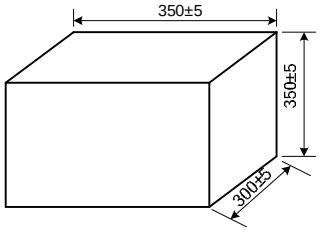


V575M T&R PACKAGE GRAPHICS (UNIT: mm)	DATE	2006-02-17
	MADE BY	
	AUDITOR	
	APPROVED BY	

4.BOX 1



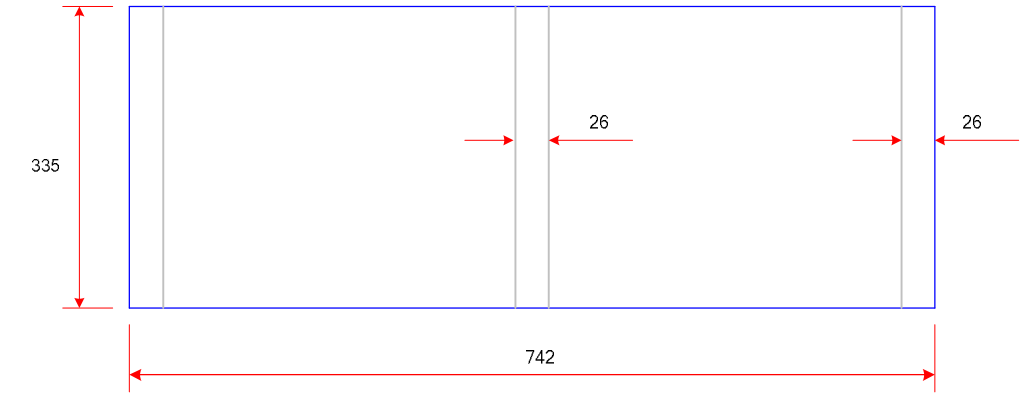


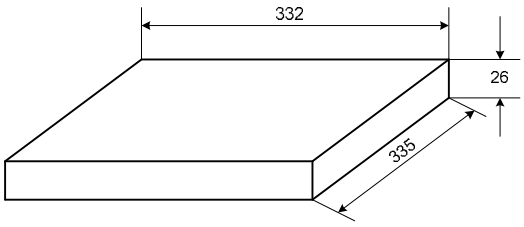


BOX 1

V575M T&R PACKAGE GRAPHICS (UNIT: mm)	DATE	2006-02-17
	MADE BY	
	AUDITOR	
	APPROVED BY	

5.BOX 2





	REEL	BOX		
Package Format	Pcs / REEL	Reel/BOX2	BOX2 / BOX1	PCS / BOX1
SSOP-20	2500	1	10	25000

6、GREEN-MARK

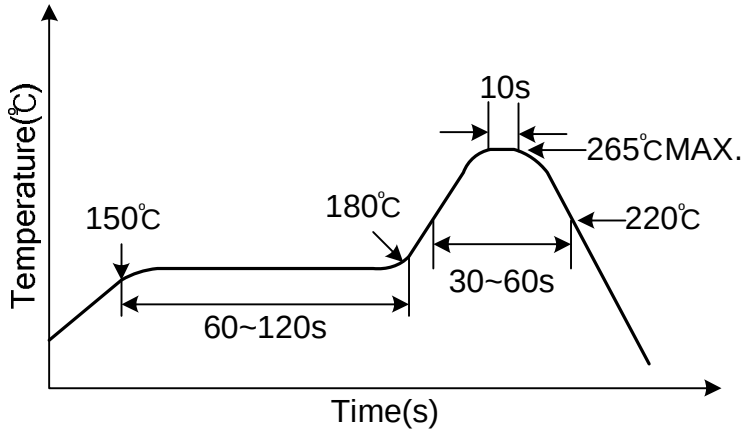
"Pb-FREE" label attached on the side of Plastic Pocket and attached above the bar code outside of the BOX2 .

V575M BILL OF MATERIAL	DATE	2006-02-17
	MADE BY	
	AUDITOR	
	APPROVED BY	

Name of the part	Material weight (mg/unit)	Material name	Material analysis (element)	Material analisys (weight%)
Lead Frame	55.75	194	Fe Zn P Cu	2.1%-2.6% 0.05%-0.2% 0.015%-0.15% BAL
Plastic	85.1	Epoxy resin	Silica Fused Epoxy resin Phenol Novolac Antimony Trioxide Brominated Epoxy resin Carbon Black	70%-90% 8%-12% 4%-7% 1%-3% 1.5%-3.5% 0.1%-0.5%
Chip	1	Doped Silicon		>99%
Die Attach Material	0.45	Glue	Ag Epoxy resin	60%-95% 10%-30%
			γ-丁丙酯 酚醛树脂	5%-0% 1%-5%
Wires	0.2	Gold	Au	>99.99%
Leads finishing	2.2	Lead-Free	Pb＜100ppm	

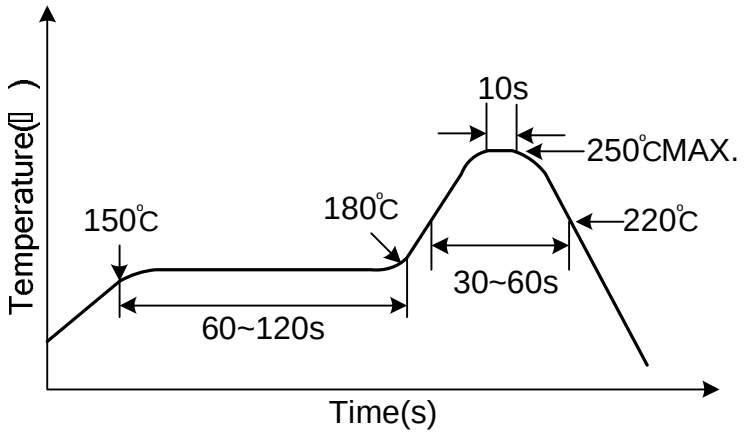
V575M INFRARED REFLOW SOLDERING CONDITION (SUGGESTION)	DATE	2006-02-17
	MADE BY	
	AUDITOR	
	APPROVED BY	

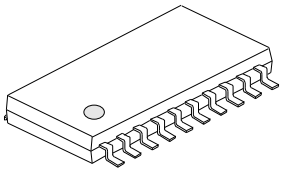
MAX. Temperature (Surface)	:	Below 265℃
MAX. Temperature Duration	:	<10s
Above 220℃ Duration	:	30-60s
Between 150℃ and 180℃ Duration	:	60-120s
Soldering Times	:	2 Times

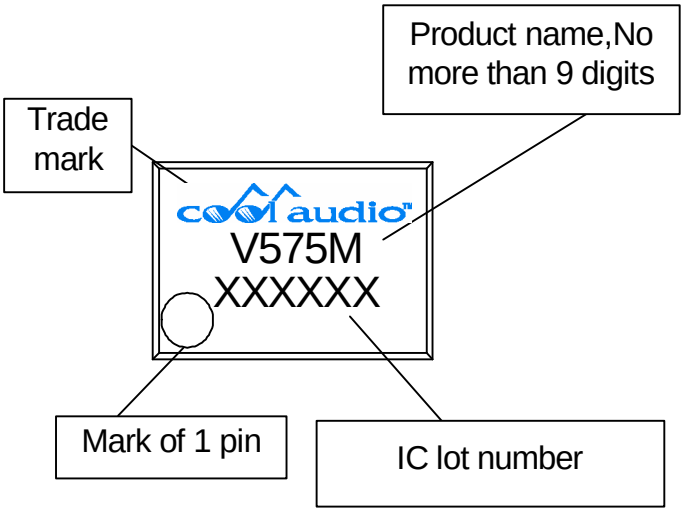


V575M WAVE SOLDERING CONDITION (SUGGESTION)	DATE	2006-02-17
	MADE BY	
	AUDITOR	
	APPROVED BY	

MAX. Temperature (Surface)	:	Below 250℃
MAX. Temperature Duration	:	<10s
Pre-heat Temperature	:	120℃
Soldering Times	:	1 Times



Package form	
SSOP–20–173	



Lot number :
The 1st digit:symbol of assembly factory
The 2nd digit:the last number of the year
The 3rd digit: symbol of month
The last 3 digits: the number of order