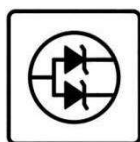
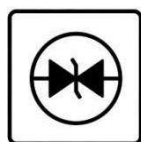


MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

LM224DT(MS)

产品规格手册

概述

本电路为高性能、具有四个独立的运算放大器，内含相位补偿电路，适用于录音机和音调系统作音调均衡网络，也用于其他场合。采用 14 引线双列贴片式塑料封装 SOP-14，功耗 600mW。

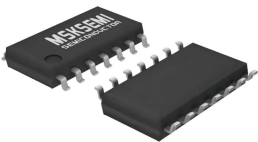
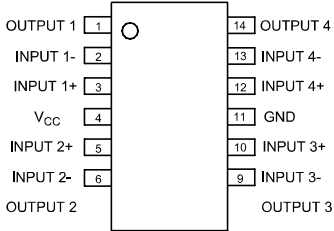

产品特点

- 无需外接相位补偿电路
- 电源电压范围宽：单电源时， $V_{CC}=3\sim 32V$ ，双电源时， $V_{CC}=\pm 1.5V\sim 16V$
- 功耗电流小： $I_{CC}=0.6mA$ （典型）（ $R_L=\infty$ ）
- 输入电压范围可接近地电平

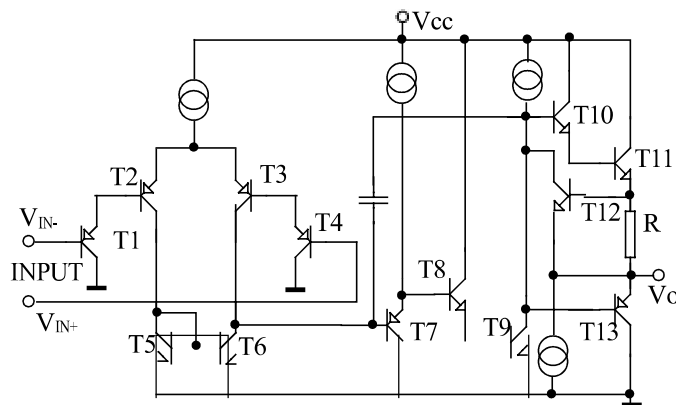
原理简介

LM224DT(MS) 由四个完全相同的运算放大器组成，单元电路如图所示，其工作原理简要说明如下：输入信号加到 T1、T4 基极，经差分放大后；T8、T9 于复合放大构成中间级；输出级由 T10~T13 组成。其中 T12 为保护管，当输出电流过大时，R 上压降增大使 T12 饱和导通，T12 集电极电位下降，接近 $1/2V_{CC}$ ，使得推挽管 T10、T11 和 T13 截止，从而起到保护作用。电容 C 为相位补偿电容。

封装形式和管脚功能定义

封装图	脚位信息	丝印
		
SOP-14		

内部线路图



引脚端功能符号

引出端序号	功 能	符 号	引出端序号	功 能	符 号
1	输出 1	OUT1	8	输出 3	OUT3
2	反向输入 1	IN- (1)	9	反向输入 3	IN- (3)
3	正向输入 1	IN+ (1)	10	正向输入 3	IN+ (3)
4	电源	V _{cc}	11	地	GND
5	正向输入 2	IN+ (2)	12	正向输入 4	IN+ (4)
6	反向输入 2	IN- (2)	13	反向输入 4	IN- (4)
7	输出 2	OUT2	14	输出 4	OUT4

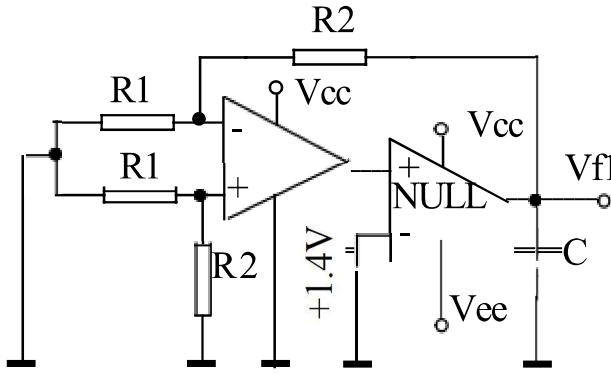
极限参数 (绝对最大额定值, 若无其它规定, T_{amb}=25℃)

参 数	符 号	测 试 条 件	额 定 值	单 位
电源电压	V _{cc}		32	V
差动输入电压	V _{ID}		32	V
最大输入电压	V _{IN}		-0.3~24	V
允许功耗	P _D		600	mW
工作温度	T _{opr}		0~+70	℃
贮存温度	T _{stg}		-55~+125	℃

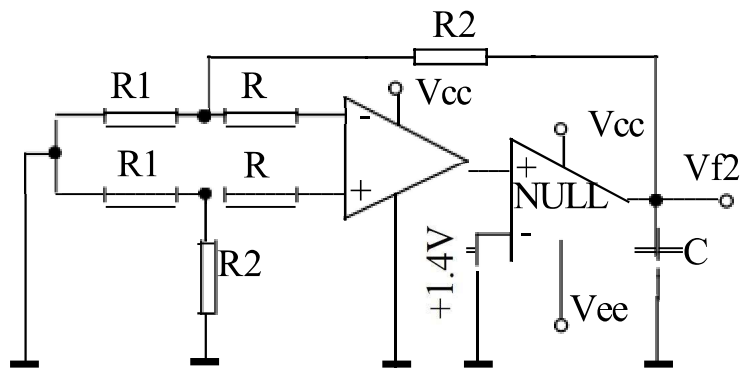
电特性 (若无其它规定, V_{cc}=5V, T_{amb}=25℃)

参 数	符 号	测 试 条 件	最 小 值	典 型 值	最 大 值	单 位
失调输入电压	V _{IO}			±2	±7	mV
输入失调电流	I _{IO}	I _{in(+)} /I _{in(-)}		±5	±50	nA
输入偏置电流	I _{BA}			45	250	nA
共模输入电压范围	V _{ICM}		0		V _{cc} -1.5	V
共模抑制比	K _{CMR}		56			dB
强信号电压增益	G _V	V _{cc} =15V, R _L ≥ 2 kΩ	25	100		V/mV
输出电压范围	V _O		0		V _{cc} -1.5	V
电源纹波抑制比	PSRR		65			dB
通 道 分 离	C _s	f=1kHz~20kHz		120		dB
静态消耗电流 (1)	I _{cc}			0.6	2	mA
静态消耗电流 (2)	I _{cc}	V _{cc} =20V		1.5	3	mA
输出拉电流	I _o	V _{in+} =1V, V _{in-} =0V	20	40		mA
输出灌电流	I _o	V _{in+} =0V, V _{in-} =1V	10	20		mA

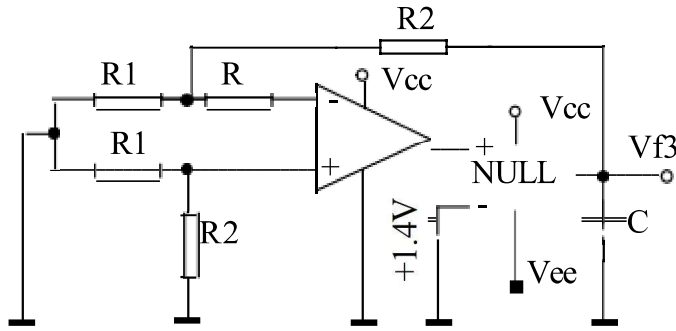
测试原理图 (注: NULL 指零放大器)



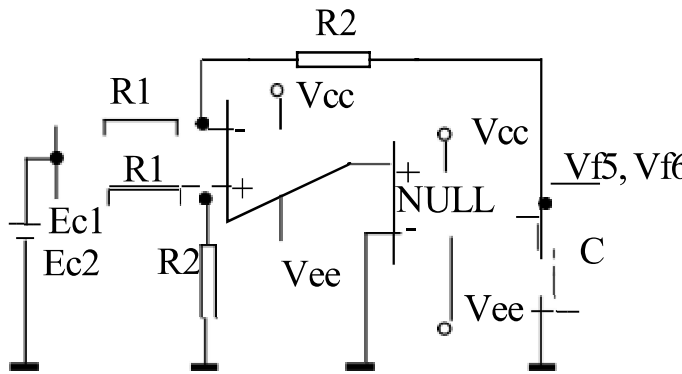
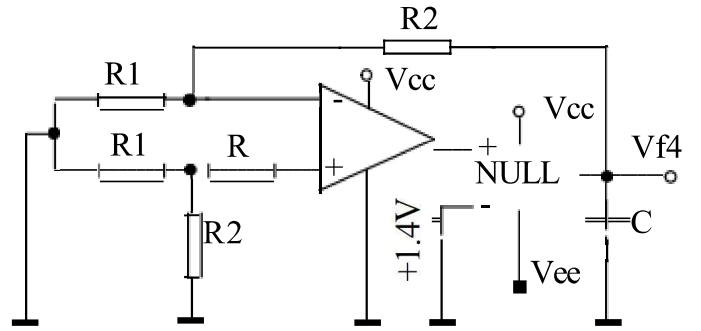
$V_{io} = V_{f1} / (1 + R2/R1)$
输入失调电压 V_{io} 测试图



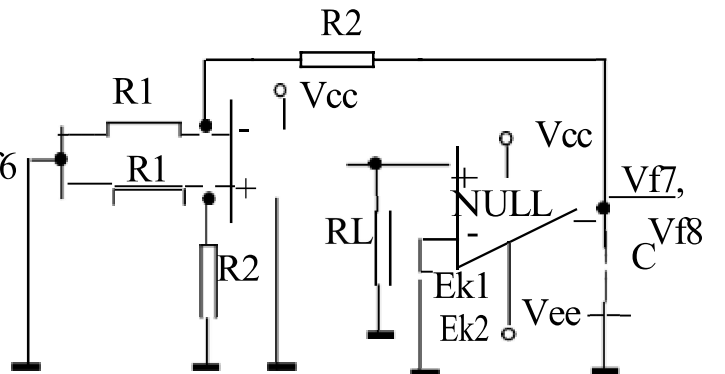
$I_{io} = (V_{f2} - V_{f1}) / R (1 + R2/R1)$
输入失调电流 I_{io} 测试图



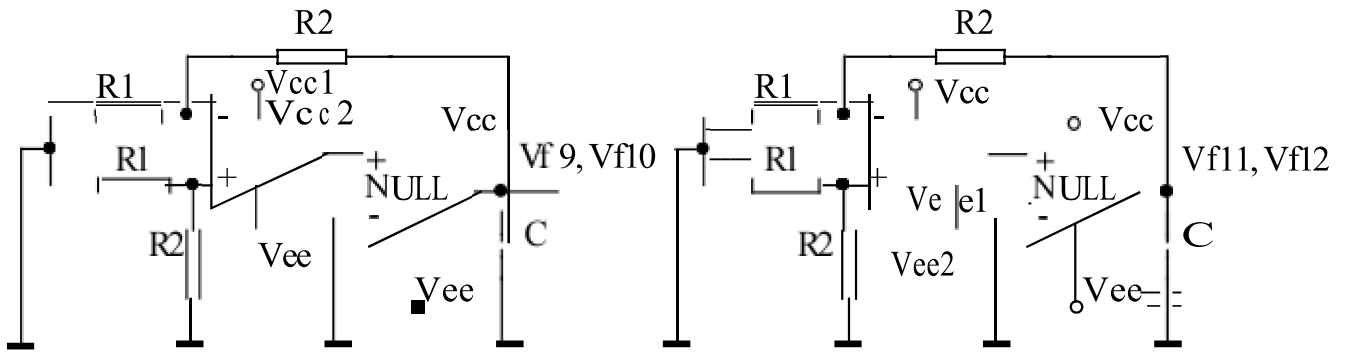
$I_{BA} = (V_{f4} - V_{f3}) / 2R (1 + R2/R1)$
输入偏置电流 I_{BA} 测试图



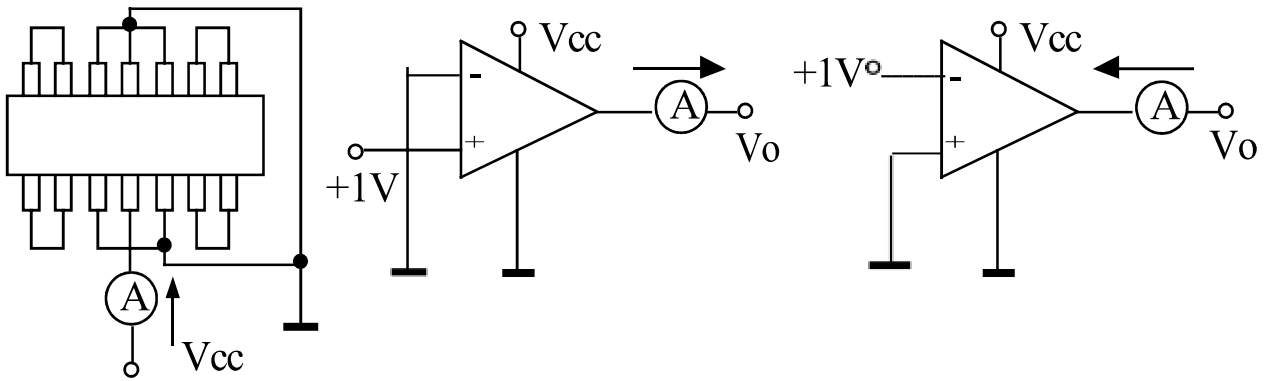
$CMR = 20 \log (E_{c1} - E_{c2}) (1 + R2/R1) / (V_{f5} - V_{f6})$
共模抑制比 CMR 及共模输入电压范围 V_{ICM} 测试图



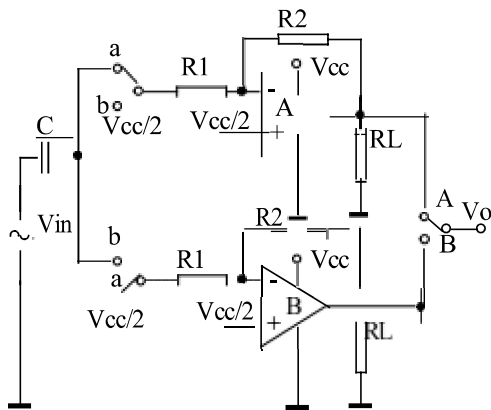
$G_v = (E_{k1} - E_{k2}) (1 + R2/R1) / (V_{f8} - V_{f7})$
电压增益 G_v 测试图



$PSRR (+) = 20 \log \frac{(V_{cc1} - V_{cc2}) (1 + R2/R1)}{(V_{f9} - V_{f10})}$
 $PSRR (-) = 20 \log \frac{(V_{ee1} - V_{ee2}) (1 + R2/R1)}{(V_{f11} - V_{f12})}$
 电源纹波抑制比 PSRR 测试图



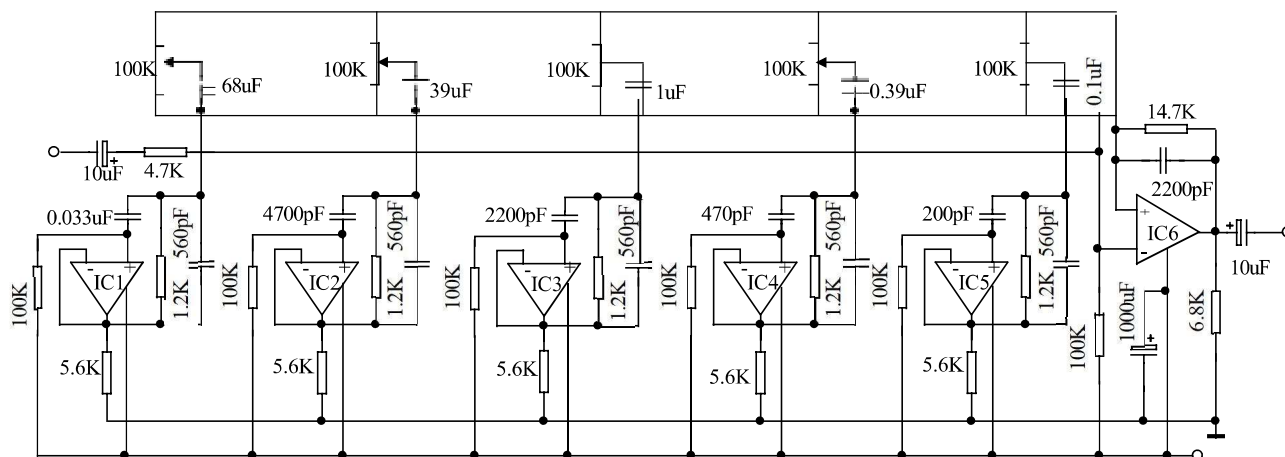
消耗电流 I_{cc} 及输出电流 I_o 测试图



通道分离度 C_s 测试图

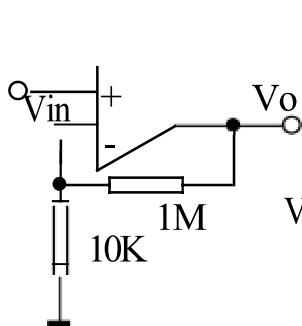
SW: A
 $C_s (A) = 20 \log \frac{R2 * V_{OA}}{R1 * V_{OB}}$
 SW: B
 $C_s (B) = 20 \log \frac{R2 * V_{OB}}{R1 * V_{OA}}$

应用图

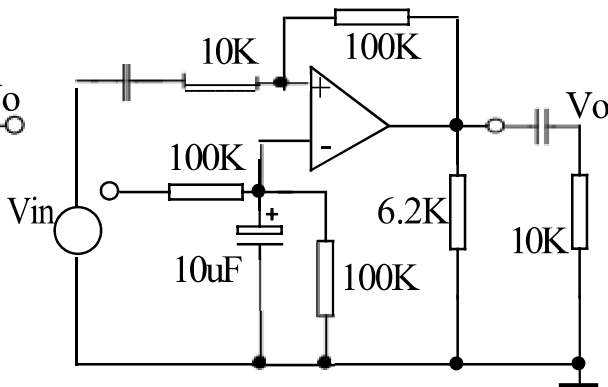


LM224用于五频率音调控制电路

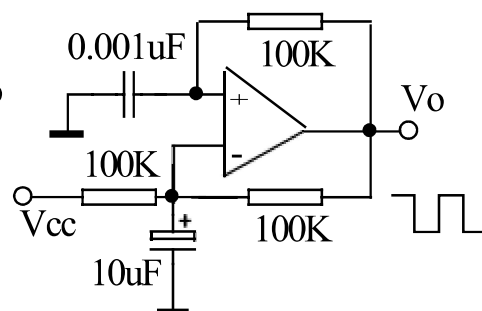
直流放大器



倒相放大器

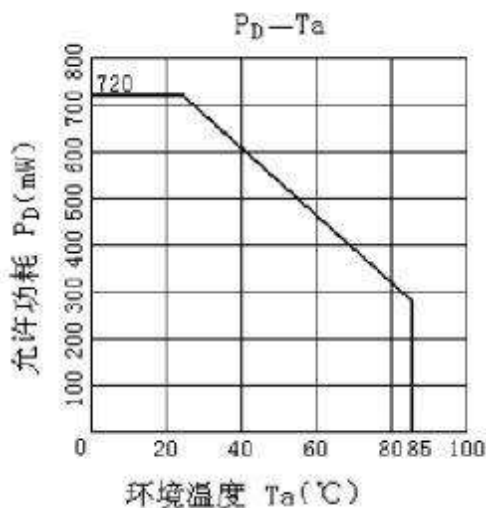


矩形波发生器

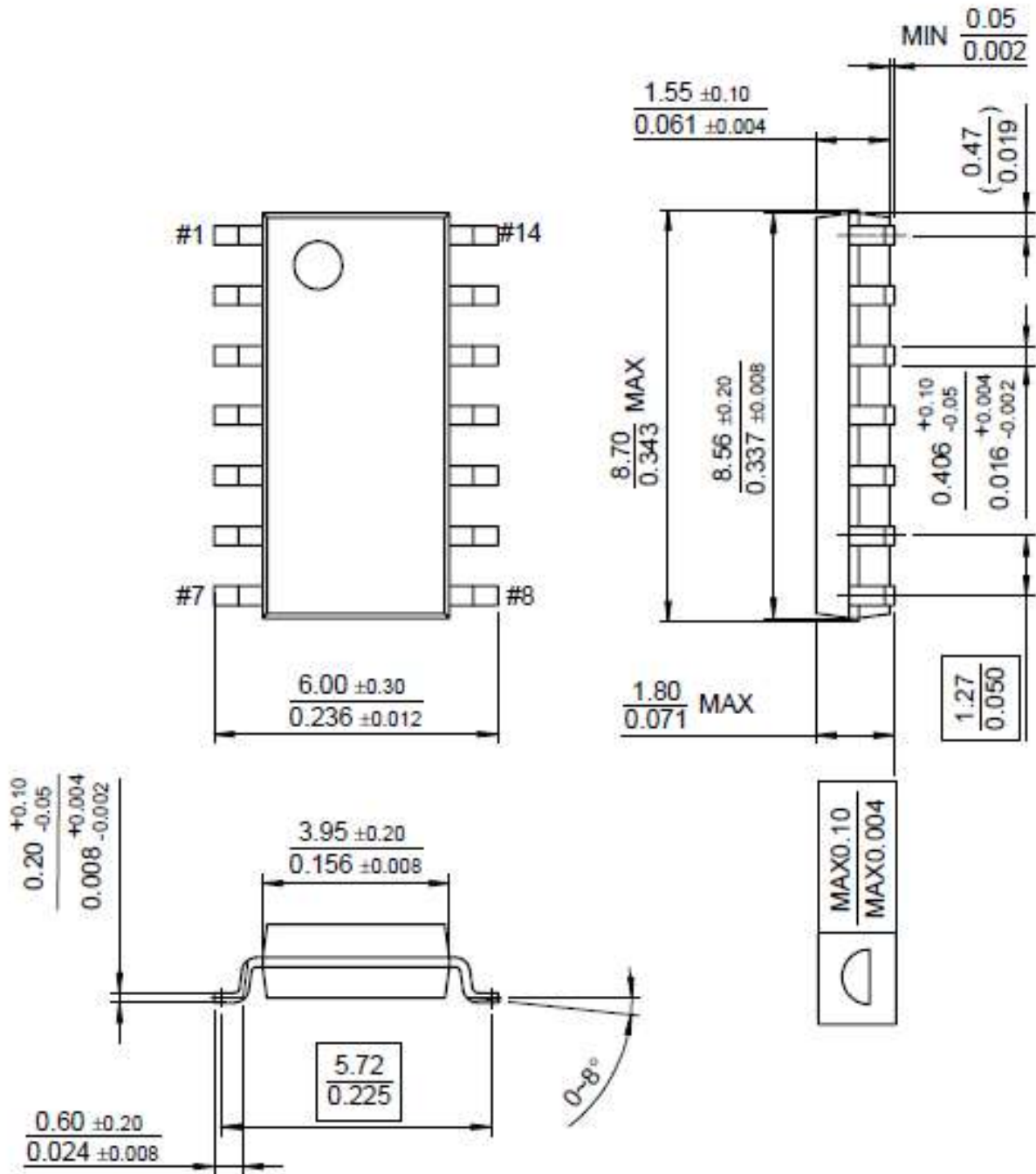


LM224的其它应用

特性曲线



SOP14



订购信息

P/N	PKG	QTY
LM224DT (MS)	SOP-14	2500

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