

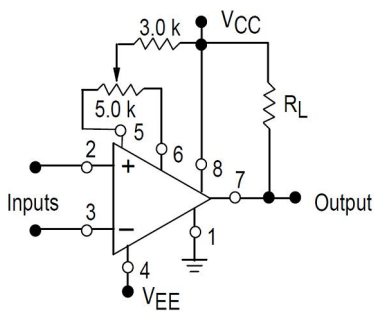
高灵活性电压比较器 LM311

概述:

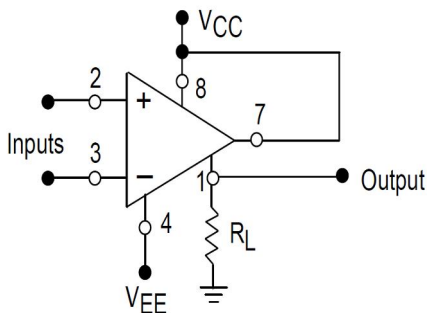
LM311能工作于5V至30V的单电源或±15V的双电源，和常用的比较器一样，LM311可成为一种真正的通用比较器。LM311输入可与系统隔离，而输出可以地为参考，也可以电源或VEE为参考，此灵活性可以驱动DTL、RTL、TTL或MOS电平逻辑。在输出电流50mA时，该输出可以把电压切换到50V，可用于驱动继电器、灯或螺线管。

典型比较器设计方案

带失调平衡的分离电源

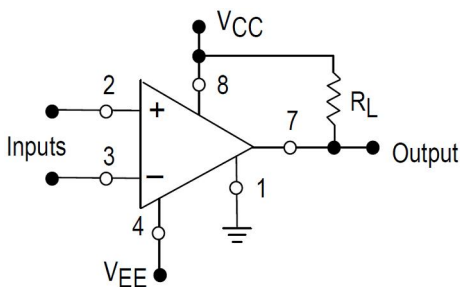


以地为参考的负载

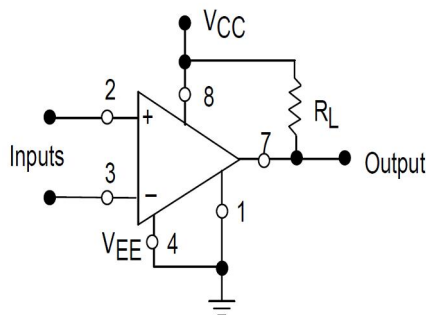


(当 GND 作为输出时，输入极性反转)

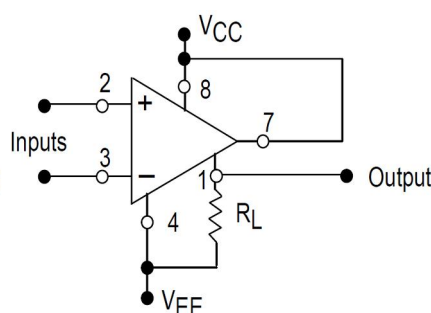
以正电源为参考的负载



单电源

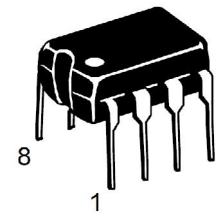
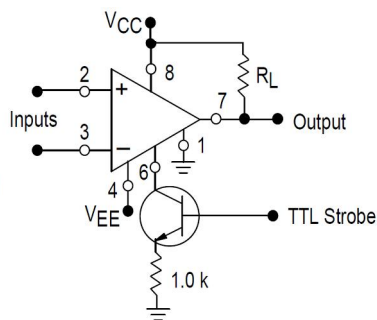


以负电源为参考的负载

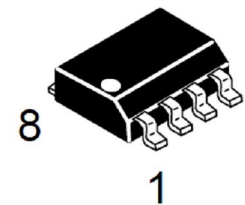


(当 GND 作为输出时，输入极性反转)

选通能力

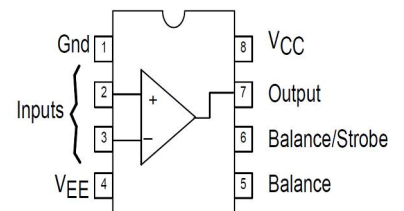


N 后缀，塑封，case 626



D 后缀，塑封，case 751
(SOP-8)

管脚排列图 (Top View)



订购信息

Device	Operating Temperature Range	Package
LM211D	$T_A = 25^\circ \text{ to } +85^\circ \text{C}$	SO-8
LM311D LM311N	$T_A = 0^\circ \text{ to } +70^\circ \text{C}$	SO-8 Plastic DIP

极限参数(TA = +25°C, unless otherwise noted.)

Rat	Symbol	LM211	LM311	Unit
总电源电压	$V_{CC} + V_{EE} $	36	36	Vdc
输出至负电源电压	$V_O - V_{EE}$	50	40	Vdc
地至负电源	V_{EE}	30	30	Vdc
输入差动电压	V_{ID}	±30	±30	Vdc
输入电压(Note 2)	V_{in}	±15	±15	Vdc
选通Strobe脚电压	–	V_{CC} to $V_{CC}-5$	V_{CC} to $V_{CC}-5$	Vdc
功耗及热特性 塑封DIP Ta超过25°C下降	P_D	625 5.0		mW mW/°C
工作环境温度	T_A	–25 to +85	0 to +70	°C
工作结温	$T_J(max)$	+150	+150	°C
贮存温度	T_{stg}	–65 to +150	–65 to +150	°C

电气特性 (VCC = +15 V, VEE = –15 V, TA = 25° C, unless otherwise noted [Note 1].)

参数	Symbol	LM211			LM311			Unit
		Min	Typ	Max	Min	Typ	Max	
输入失调电压 (Note 3) $R_S \leq 50\text{ k}$, $T_A = +25^\circ\text{C}$ $R_S \leq 50\text{ k}$, $T_{low} \leq T_A \leq T_{high}^*$	V_{IO}	–	0.7	3.0	–	2.0	7.5	mV
		–	–	4.0	–	–	10	
失调电流 (Note 3) $T_A = +25^\circ\text{C}$ $T_{low} \leq T_A \leq T_{high}^*$	I_{IO}	–	1.7	10	–	1.7	50	nA
		–	–	20	–	–	70	
输入偏置电流 $T_A = +25^\circ\text{C}$ $T_{low} \leq T_A \leq T_{high}^*$	I_{IB}	–	45	100	–	45	250	nA
		–	–	150	–	–	300	
电压增益	A_V	40	200	–	40	200	–	V/mV
响应时间 (Note 4)		–	200	–	–	200	–	ns
饱和压降 $V_{ID} \leq -5.0\text{ mV}$, $I_O = 50\text{ mA}$, $T_A = 25^\circ\text{C}$ $V_{ID} \leq -10\text{ mV}$, $I_O = 50\text{ mA}$, $T_A = 25^\circ\text{C}$ $V_{CC} \geq 4.5\text{ V}$, $V_{EE} = 0$, $T_{low} \leq T_A \leq T_{high}^*$ $V_{ID} \leq 6.0\text{ mV}$, $I_{sink} \leq 8.0\text{ mA}$ $V_{ID} \leq 10\text{ mV}$, $I_{sink} \leq 8.0\text{ mA}$	V_{OL}	–	0.75	1.5	–	–	–	V
		–	–	–	–	0.75	1.5	
		–	0.23	0.4	–	–	–	
		–	–	–	–	0.23	0.4	
选通导通电流(Note 5)	I_S	–	3.0	–	–	3.0	–	mA
输出漏电流 $V_{ID} \leq 5.0\text{ mV}$, $V_O = 35\text{ V}$, $T_A = 25^\circ\text{C}$, $I_{strobe} = 3.0\text{ mA}$ $V_{ID} \leq 10\text{ mV}$, $V_O = 35\text{ V}$, $T_A = 25^\circ\text{C}$, $I_{strobe} = 3.0\text{ mA}$ $V_{ID} \leq 5.0\text{ mV}$, $V_O = 35\text{ V}$, $T_{low} \leq T_A \leq T_{high}^*$		–	0.2	10	–	–	–	nA
		–	–	–	–	0.2	50	nA
		–	0.1	0.5	–	–	–	uA

输入电压 ($T_{low} \leq T_A \leq T_{high}^*$)	V_{ICR}	-14.5	-14.7 to 13.8	+13.0	-14.5	-14.7 to 13.8	+13.0	V
正电源电流	I_{CC}	-	+2.4	+6.0	-	+2.4	+7.5	mA
负电源电流	I_{EE}	-	-1.3	-5.0	-	-1.3	-5.0	mA

* $T_{low} = -25^{\circ}\text{C}$ 对应 LM211, $T_{low} = 0^{\circ}\text{C}$ 对应 LM311

* $T_{high} = 85^{\circ}\text{C}$ 对应 LM211, $T_{high} = 75^{\circ}\text{C}$ 对应 LM311

NOTES: 1.失调电压、失调电流、偏置电流的规格对应于电源电压单5V至±15V。

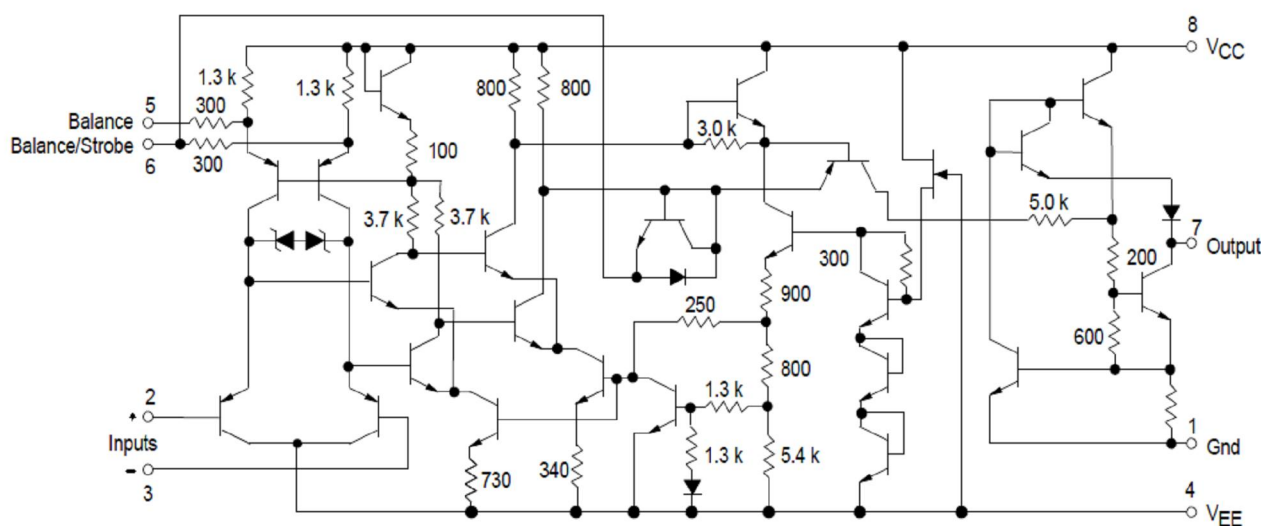
2.这一额定值针对±15V电源的情况。正输入电压限制高于负电源30V，负输入限制相当于负电源电压，或低于电源30V，或取两者中小的。

3.所给出的失调电压和失调电流时要求驱动在任一电源电压范围内，有1mA负载的最大值，这些参数就定义了误差范围，从而把电压增益和输入阻抗最坏情况考虑在内。

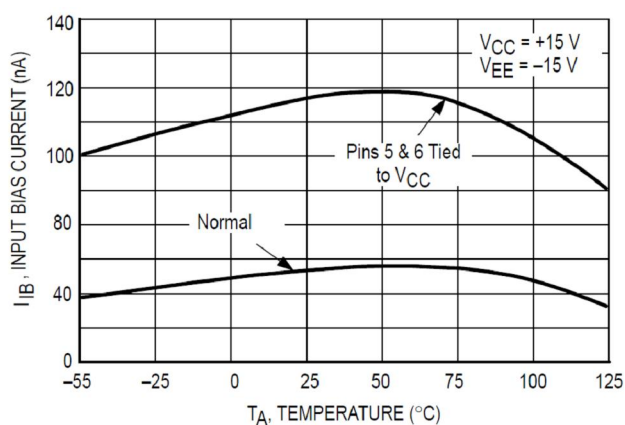
4.规定响应时间是有100mV输入，加上5mV的overdrive信号。

5.不要把选通STROBE脚直接接地，他需由3mA~5mA的电流驱动。

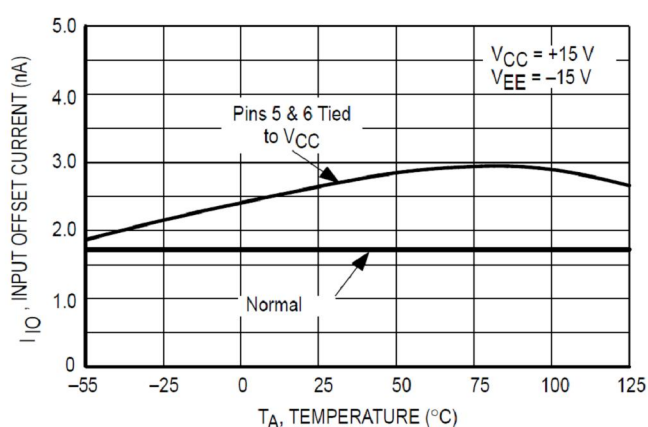
电路原理图



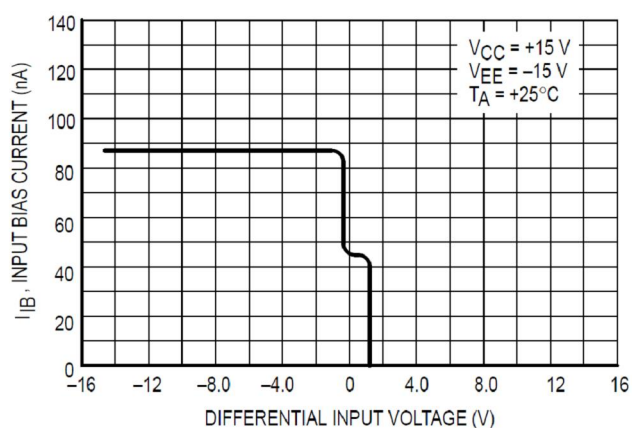
输入偏置电流与温度关系



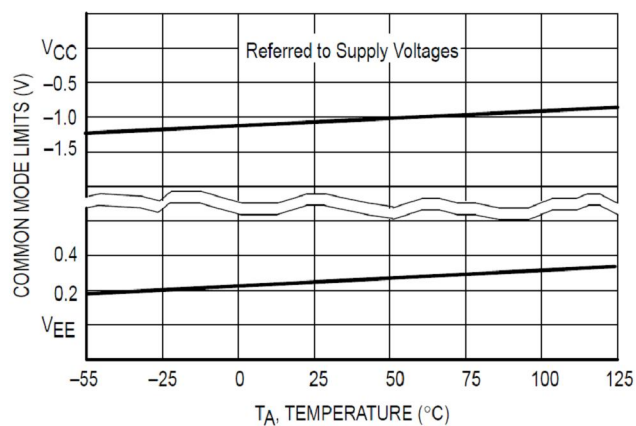
输入失调电流与温度关系



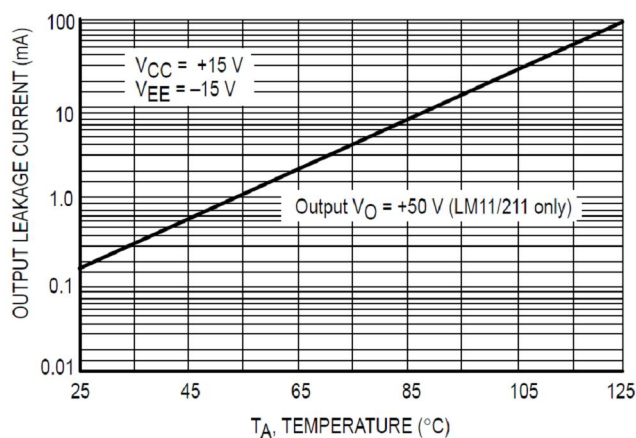
输入偏置电流与输入差动电压关系



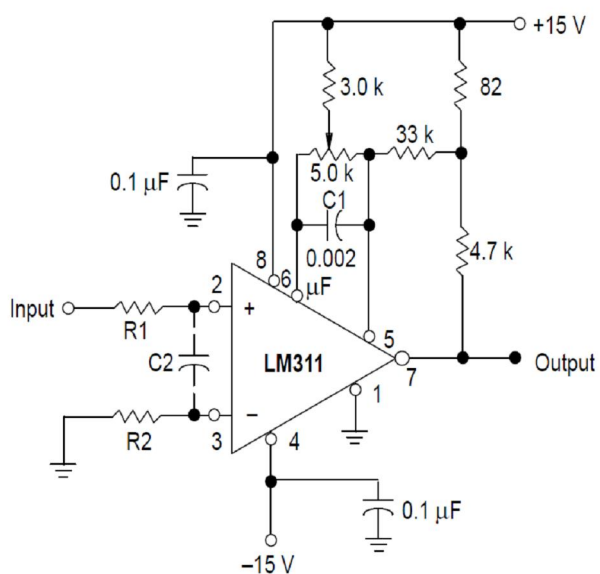
共模抑制与温度关系



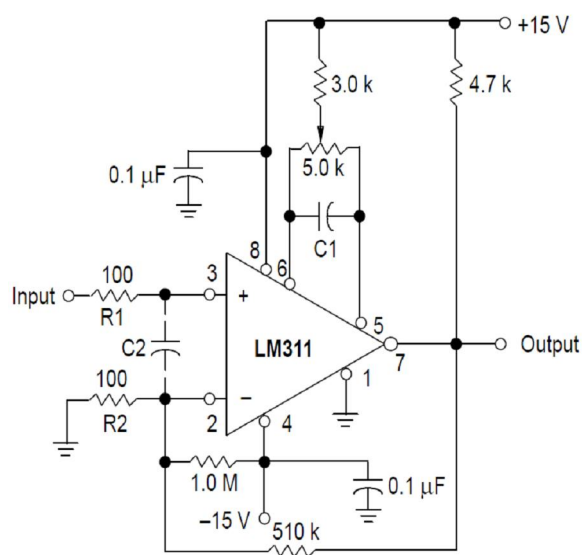
输出漏电流与温度关系



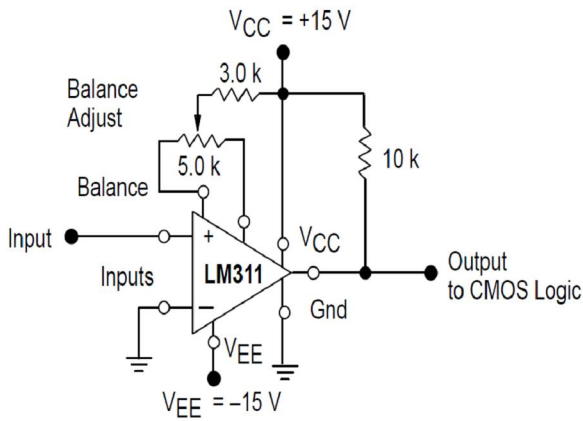
不采用输入正反馈加滞后的改进方法



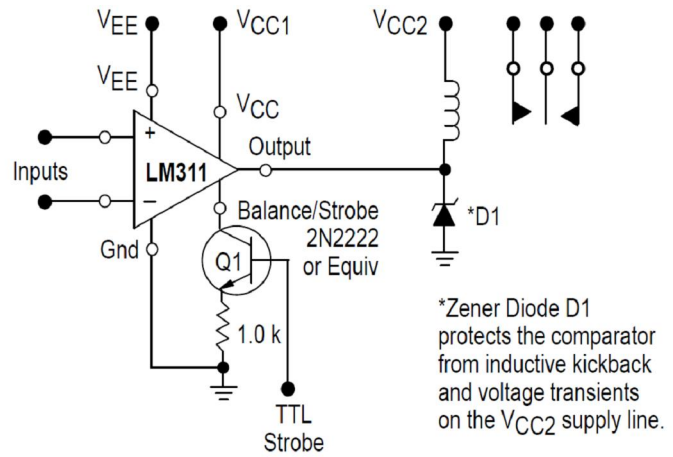
用于加滞后的技术



驱动 CMOS 逻辑的过零检测器

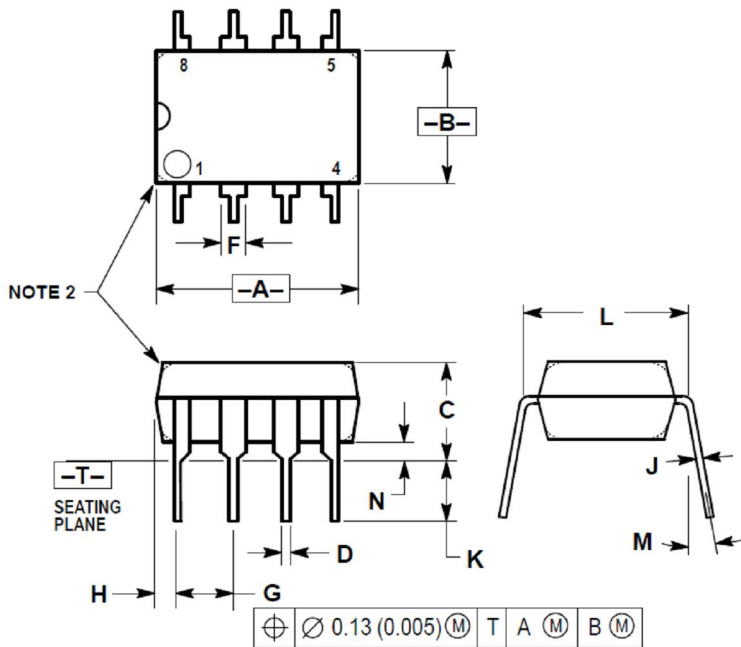


具有选通能力的继电器驱动器



封装信息

N SUFFIX PLASTIC PACKAGE CASE 626-05 ISSUE K

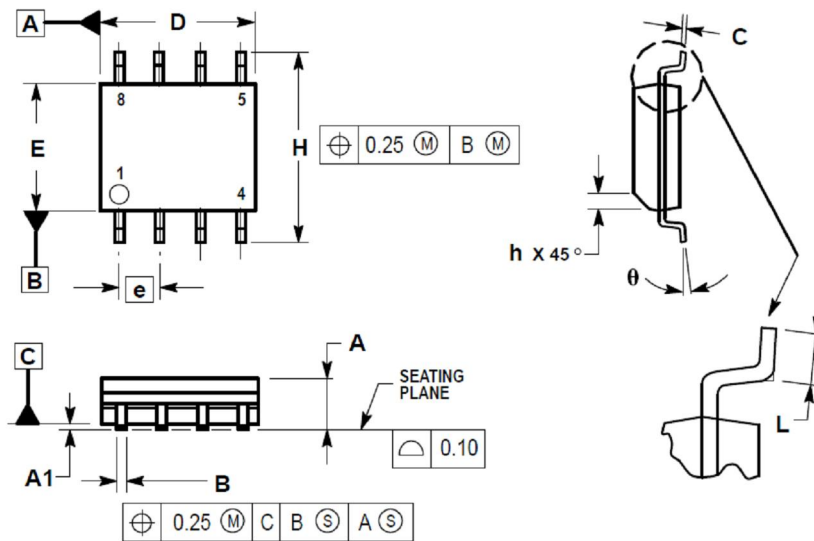


NOTES:

1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	0.76	1.27	0.030	0.050
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	10°		10°	
N	0.76	1.01	0.030	0.040

D SUFFIX
PLASTIC PACKAGE
CASE 751-05
(SO-8)
ISSUE R



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.18	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.25
θ	0°	7°