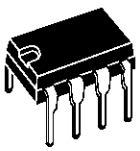
SGS-THOMSON MICROELECTRONICS

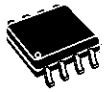
LM111
LM211 - LM311

VOLTAGE COMPARATORS

- MAXIMUM INPUT CURRENT : 150nA
- MAXIMUM OFFSET CURRENT : 20nA
- DIFFERENTIAL INPUT VOLTAGE RANGE : ±30V
- POWER CONSUMPTION : 135mW AT ±15V
- SUPPLY VOLTAGE : +5V TO ±15V
- OUTPUT CURRENT : 50mA



N
DIP8
(Plastic Package)



D
SO8
(Plastic Micropackage)

DESCRIPTION

The LM111, LM211 and LM311 are voltage comparators that have low input currents.

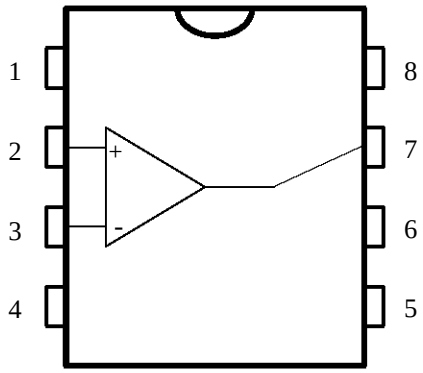
They are also designed to operate over a wide range of supply voltages : from standard ±15V operational amplifier supplies down to the single +5V supply used for IC logic.

Their output is compatible with RTL-DTL and TTL as well as MOS circuits and can switch voltages up to +50V at output currents as high as 50mA.

ORDER CODES

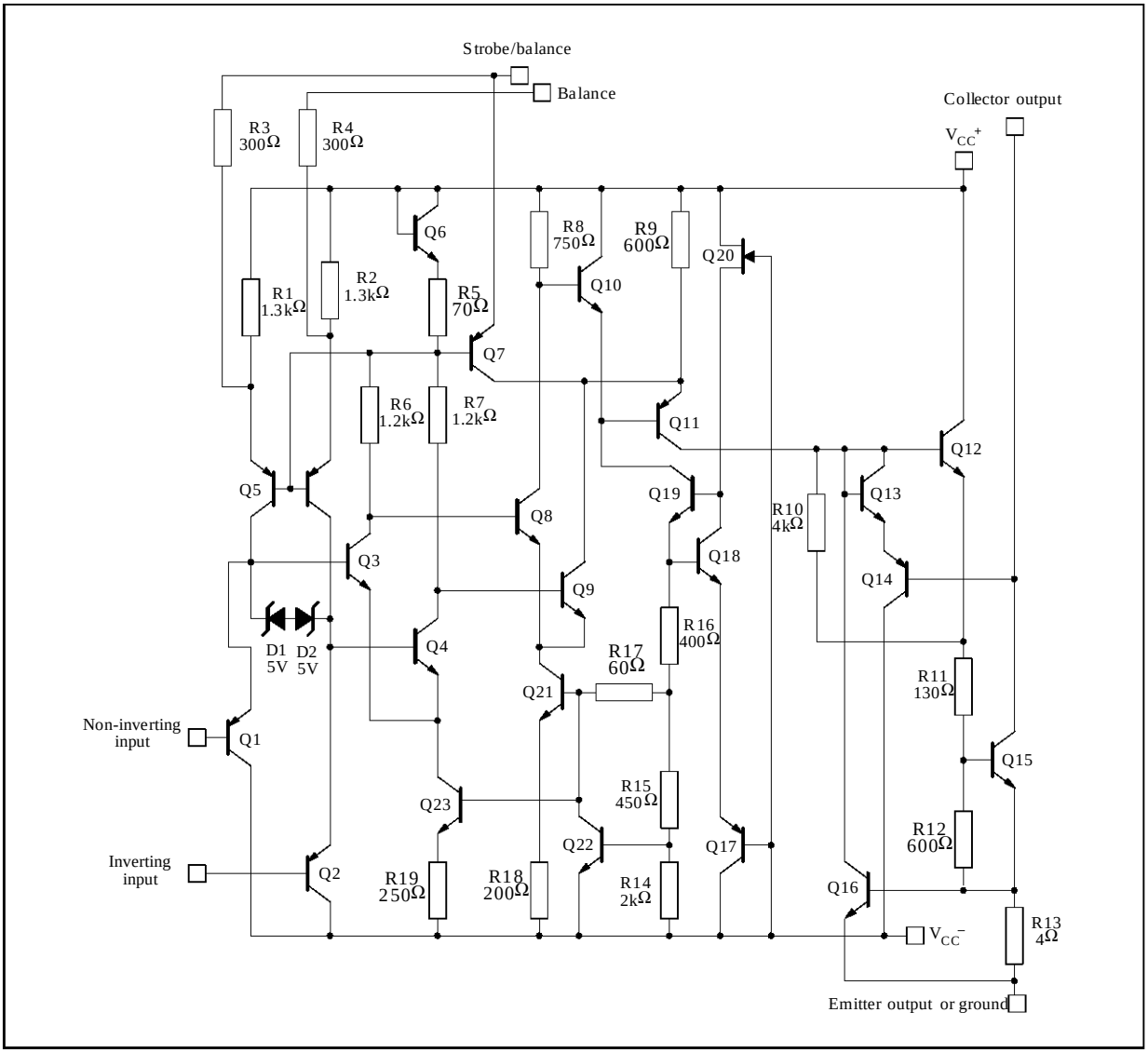
Part Number	Temperature Range	Package	
		N	D
LM111	–55, 125°C	•	•
LM211	–40, 105°C	•	•
LM311	0, 70°C	•	•
Example : LM311D			

PIN CONNECTIONS (top view)



1 - Ground
2 - Non-inverting input
3 - Inverting input
4 - V_{CC}^-
5 - Balance
6 - Strobe/balance
7 - Output
8 - V_{CC}^+

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	LM111	LM211	LM311	Unit
V_{CC}	Supply Voltage	36	36	36	V
V_{id}	Differential Input Voltage	±30	±30	±30	V
V_i	Input Voltage – (note 1)	±15	±15	±15	V
P_{tot}	Power Dissipation	500			mW
T_{oper}	Operating Free-air Temperature Range	–55 to +125	–40 to +105	0 to +70	°C
T_{stg}	Storage Temperature Range	–65 to +150	–65 to +150	–65 to +150	°C
$V_{(1-4)}$	Ground to Negative Supply Voltage	30	30	30	V
$V_{(7-4)}$	Output to Negative Supply Voltage	50	50	40	V

Output short-circuit duration : 10s
Voltage at strobe pin : V_{CC}^+ –5V

Maximum junction temperature
LM111 : +150°C
LM211 : +150°C
LM311 : +150°C

Note : 1. This rating applies for ±15V supplies. The positive input voltage limit is 30V above the negative. The negative input voltage limit is equal to the negative supply voltage or 30V below the positive supply, whichever is less.

ELECTRICAL CHARACTERISTICS

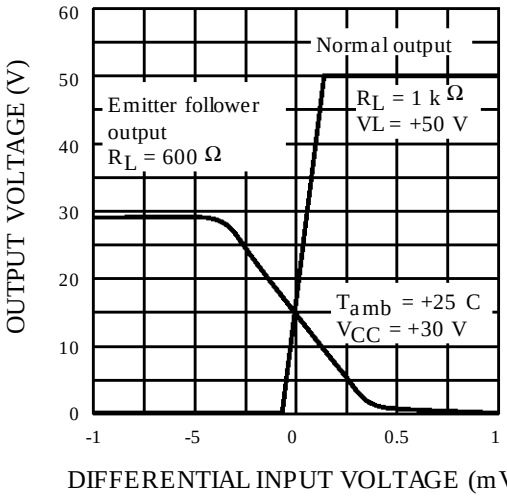
V_{CC} = ±15V, T_{amb} = 25°C **(**unless otherwise specified)

Symbol	Parameter	LM111 - LM211			LM311			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage ($R_S \leq 50k\Omega$) – (note 1) T_{amb} = +25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		0.7	3 4		2	7.5 10	mV
I_{io}	Input Offset Current – (note 1) T_{amb} = +25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		4	10 20		6	50 70	nA
I_{ib}	Input Bias Current – (note 1) T_{amb} = +25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		60	100 150		100	250 300	nA
A_{vd}	Large Signal Voltage Gain	40	200		40	200		V/mV
I_{CC}^+ I_{CC}^-	Supply Currents Positive Negative		5.1 4.1	6 5		5.1 4.1	7.5 5	mA
V_{icm}	Input Common Mode Voltage Range $T_{min.} \leq T_{amb} \leq T_{max.}$	-14.5	+13.8 -14.7	+13	-14.5	+13.8 -14.7	+13	V
V_{OL}	Low Level Output Voltage T_{amb} = +25°C, I_O = 50mA $V_i \leq$ -5mV $V_i \leq$ -10mV $T_{min.} \leq T_{amb} \leq T_{max.}$ $V_{CC}^+ \geq$ +4.5 V, V_{CC}^- = 0 I_o = 8mA $V_i \leq$ -6mV $V_i \leq$ -10mV		0.75 0.23	1.5 0.4		 0.75 0.23	 1.5 0.4	V
I_{OH}	High Level Output Current T_{amb} = +25°C $V_i \geq$ + 5mV, V_O = +35V $V_i \geq$ +10mV, V_O = +5V $T_{min.} \leq T_{amb} \leq T_{max.}$ $V_i \geq$ + 5mV, V_O = +35V		0.2 0.1	10 0.5		 0.2 	 50 	nA nA µA
I_{strobe}	Strobe Current		3			3		mA
t_{re}	Response Time – (note 2)		200			200		ns

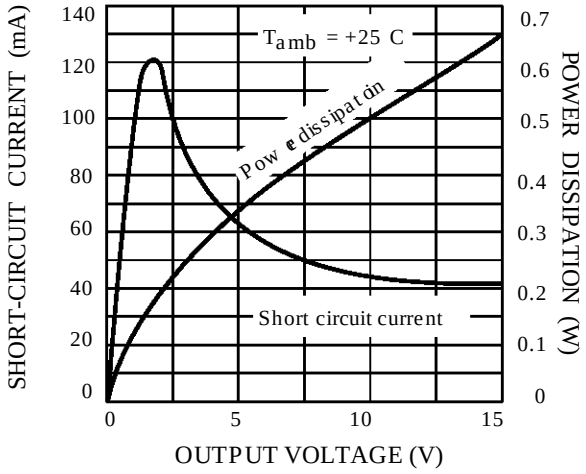
Notes : 1. The offset voltage, offset current and bias current specifications apply for any supply voltage from a single +5V supply up to ±15V supplies.
The offset voltages and offset currents given are the maximum values required to drive the output down to +1V or up to +14V with a 1mA load current. Thus, these parameters define an error band and take into account the worst-case of voltage gain and input impedance.

2. The response time specified (see definitions) is for a 100mV input step with 5mV overdrive.

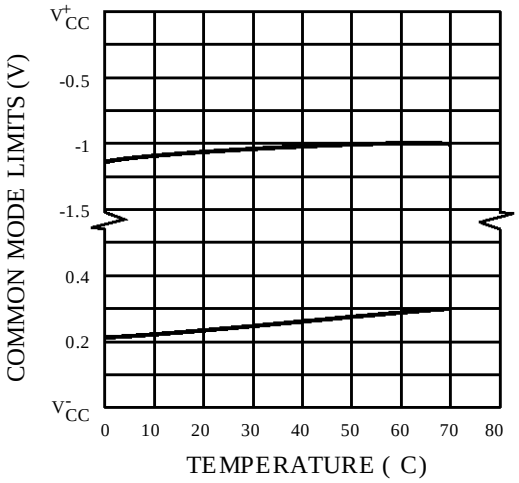
TRANSFERT CHARACTERISTICS



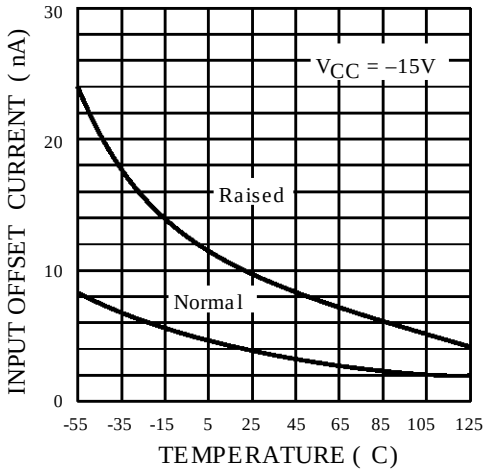
OUTPUT LIMITING CHARACTERISTICS



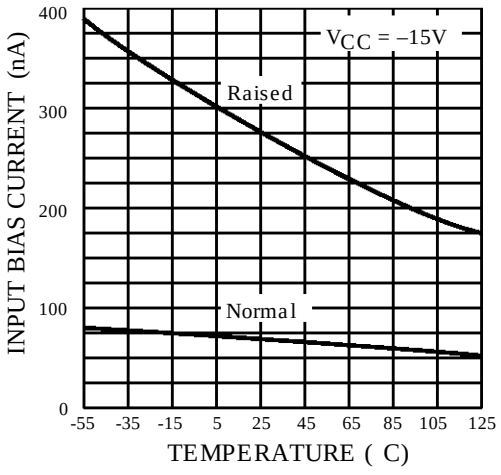
COMMON MODE LIMITS



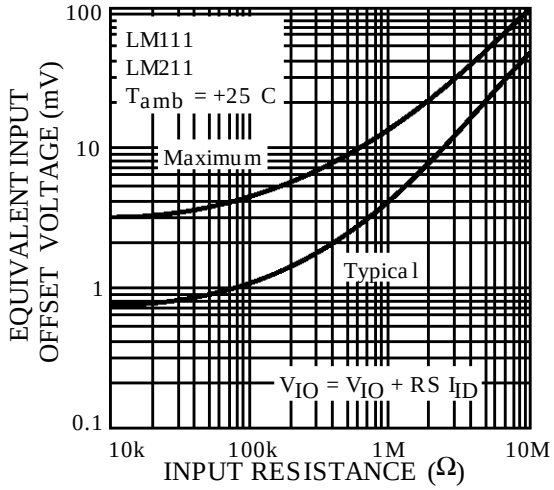
INPUT OFFSET CURRENT



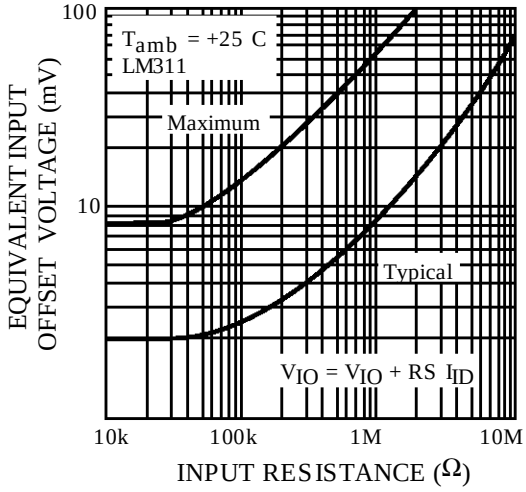
INPUT BIAS CURRENT



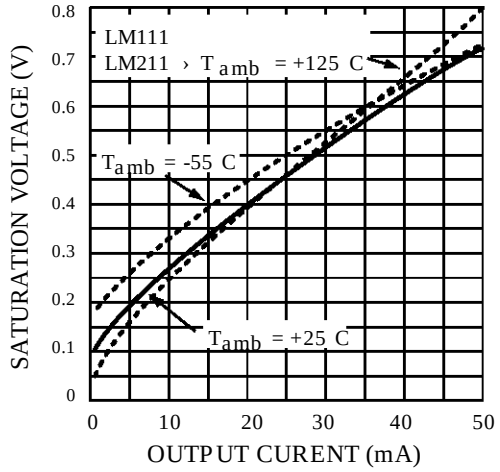
EQUIVALENT INPUT OFFSET ERROR



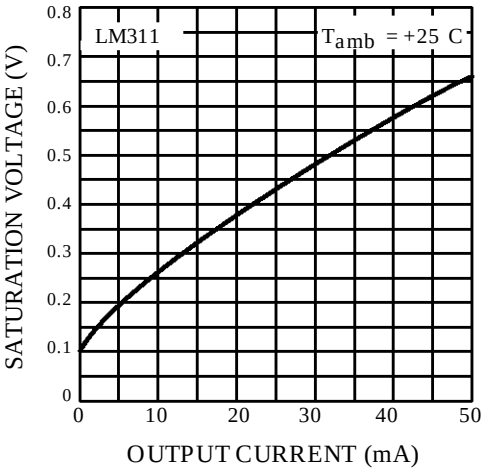
EQUIVALENT INPUT OFFSET ERROR



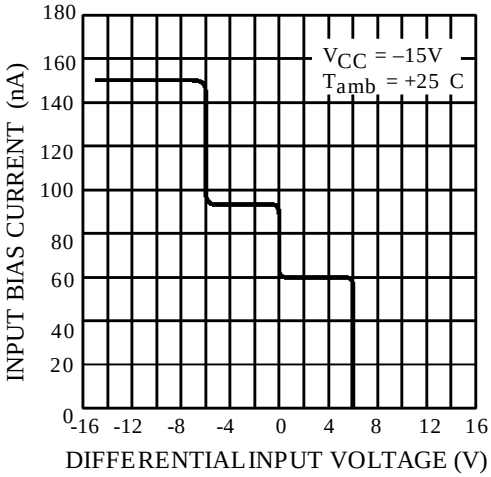
LOW LEVEL OUTPUT SATURATION VOLTAGE



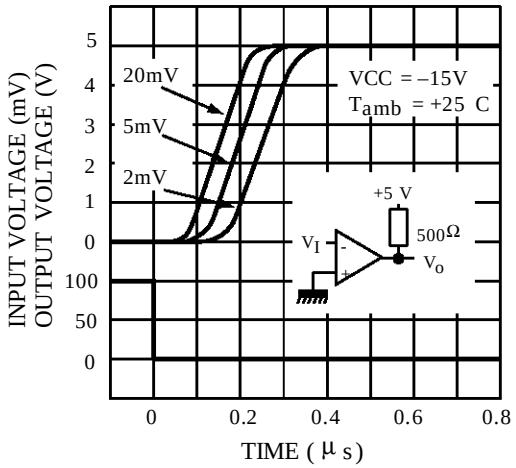
LOW LEVEL OUTPUT SATURATION VOLTAGE



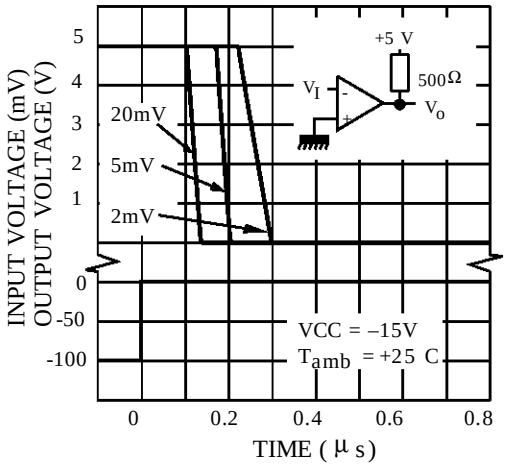
INPUT CHARACTERISTICS



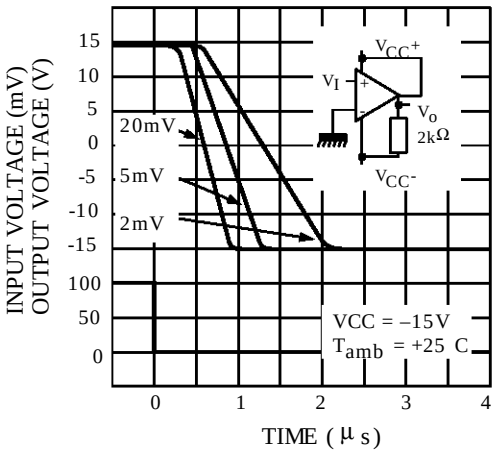
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



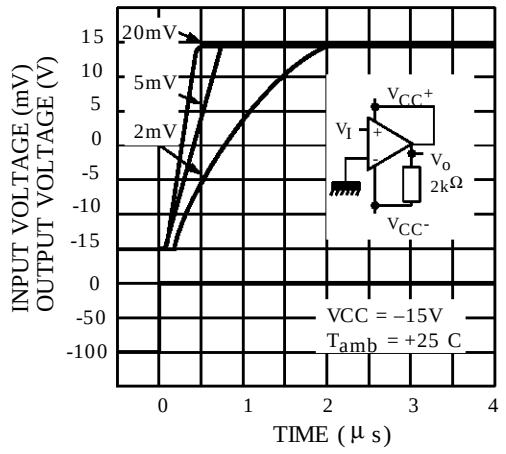
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES

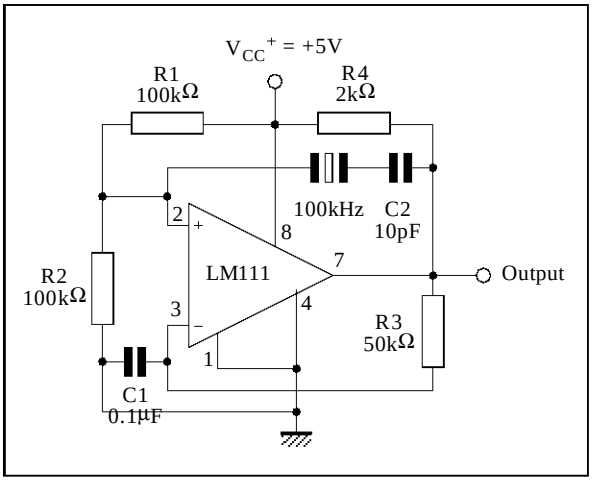


RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES

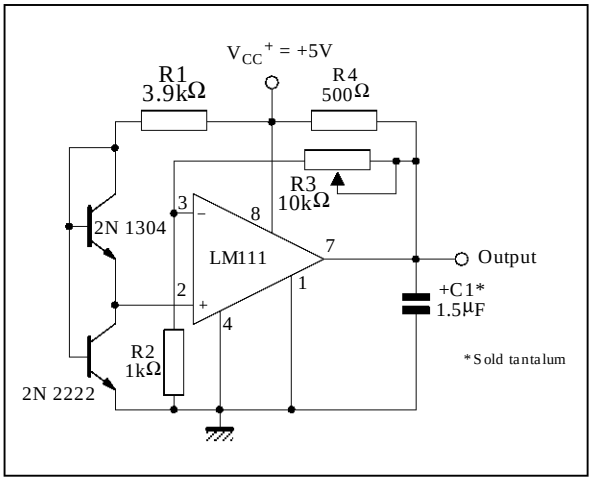


TYPICAL APPLICATIONS

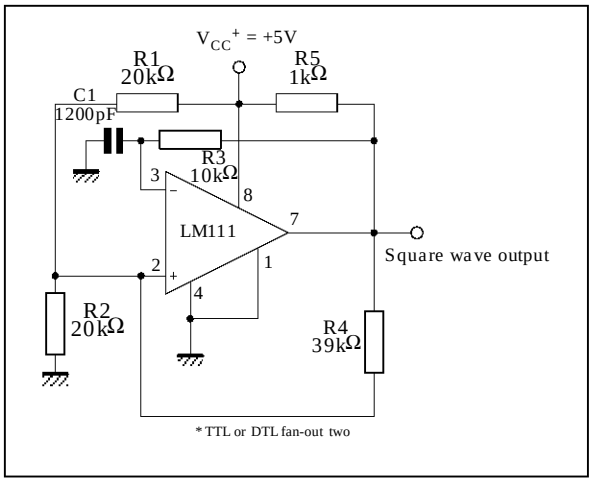
CRYSTAL OSCILLATOR



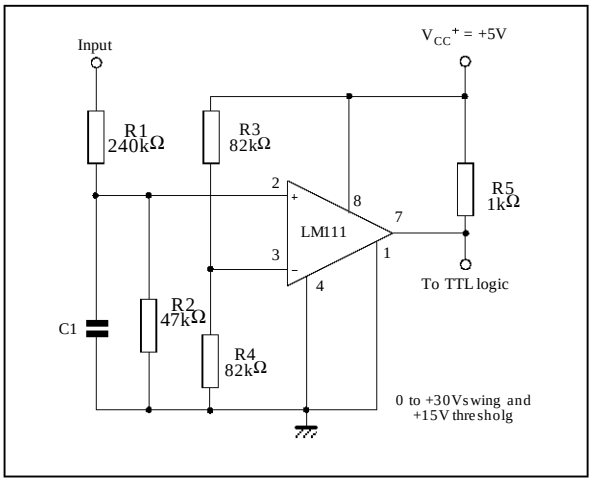
LOW VOLTAGE ADJUSTABLE REFERENCE SUPPLY



100KHz FREE RUNNING MULTIVIBRATOR

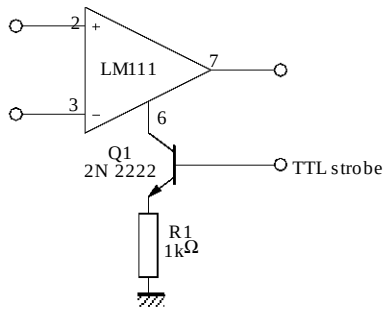


TTL INTERFACE WITH HIGH LEVEL LOGIC

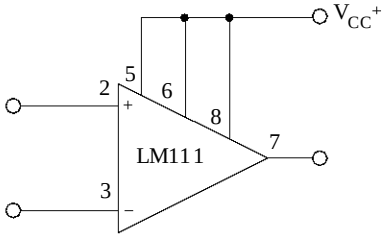


AUXILIARY CIRCUITS

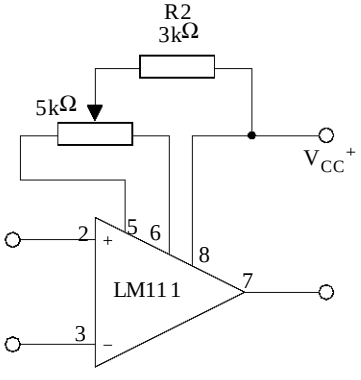
STROBE



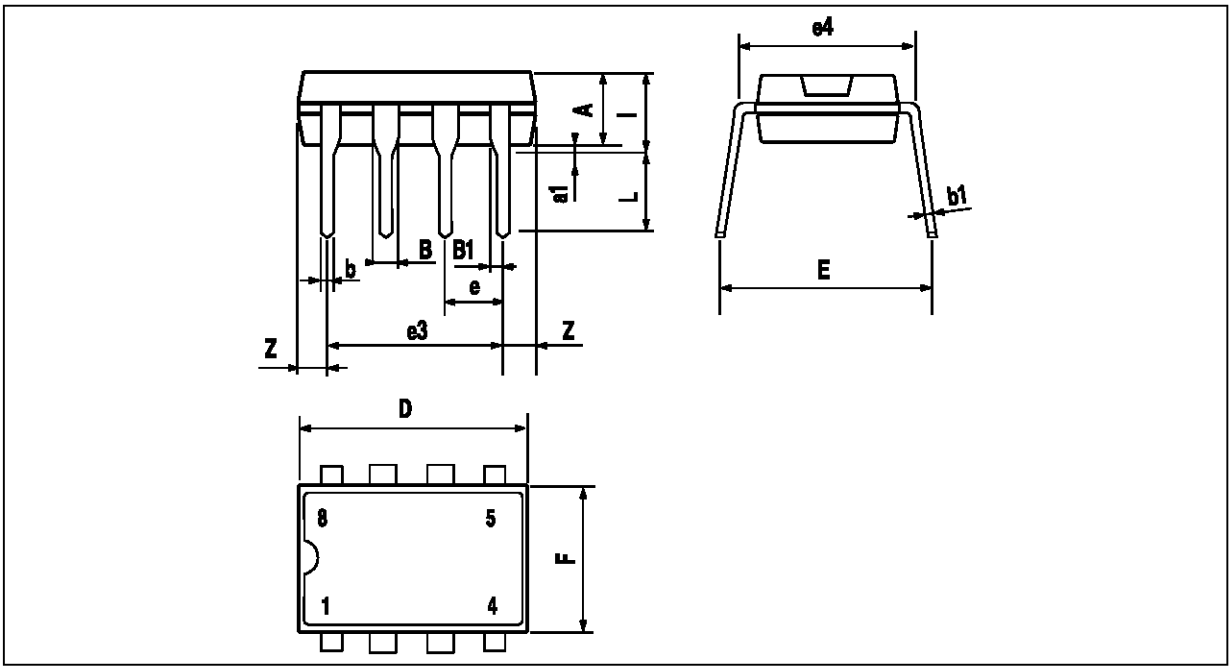
INCREASING INPUT STAGE CURRENT



OFFSET BALANCING



PACKAGE MECANICAL DATA
8 PINS - PLASTIC DIP



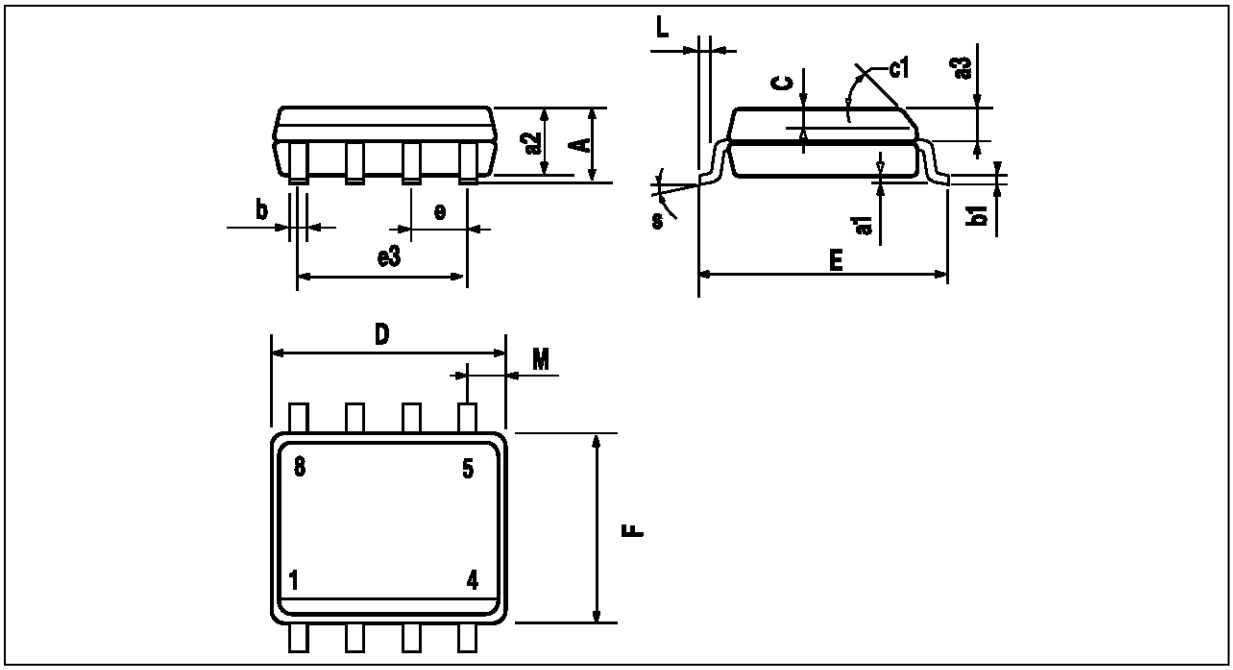
PM-DIP8.EPS

Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

DIP8.TBL

PACKAGE MECANICAL DATA

8 PINS - PLASTIC MICROPACKAGE (SO)



PM-SO8.EPS

Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45^o (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8^o (max.)					

SO8.TBL

ORDER CODE :